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AERIAL AGE WEEKLY

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THE CALL OF THE AIR

FOURTH ANNIVERSARY NUMBER

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The Christmas Bullet For Mining Transportation



MANY mines are so located that to get the precious metal or stones to market by transportation on the surface of the earth requires slow and expensive round-about travel.

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VOL. IX NEW YORK, MARCH 17, 1919

Aerial Age's Fourth Anniversary As A Weekly

TO-DAY AERIAL AGE celebrates its fourth birthday as a weekly magazine recording the latest developments in aeronautics throughout the world. We believe that our four years of existence has done much to broaden and elevate the business and to increase interest in and respect for the aeroplane and internal combustion engine as an adjunct of modern warfare, and as a medium of speeding up commerce and the intercommunication of nations.

AERIAL AGE was established to help pull American aeronautics through those "Dark Ages" when Congress was allowing only about $100,000 a year for aeronautics. Half of that sum had to be spent in maintenance and it took a whole lot of energetic workers to create public interest to force Congress to give more and to enthuse a few sportsmen to purchase aeroplanes for sport.

It required courage to adopt the name AERIAL AGE. At that time the possible value of aeroplanes for military purposes was still a matter of opinion—and the general opinion was that aeroplanes could not be more than scouts. It was held that aeroplanes could not be used for effective offensive and defensive because the recoil of a gun or the dropping of a bomb large enough to do damage would upset them.

The possibility of large aeroplanes equipped with two motors was denied on these grounds: 1, That the thickness of the wings of the aeroplanes must increase in proportion to the span of the wings; 2, that a machine equipped with two motors would spin around out of control as soon as one of the motors stopped.

The very term "factor of safety" was unknown at the time and every machine built was an experiment.

AERIAL AGE was established in March, 1915. Clouds from the war storm which was raging in Europe were beginning to darken America's horizon and energetic work was necessary to awaken this country to the need of aerial preparedness on a large scale.

The United States Army and Navy combined had less than fifty aviators, including those in charge of the administration of the Aviation Section. There were no dirigibles or kite balloons in either the Army or Navy.

The aeronautic industry consisted of a handful of courageous pioneers who had and were doing business at a loss. Congress had only allowed $300,000 for Army aeronautics and $1,000,000 for Navy aeronautics. The Allied countries were ready to give substantial orders, but they would only place orders for prompt deliveries, and as the manufacturers were not in a position to deliver, they would not place the orders.

The editors of AERIAL AGE realized that the war would be decided in the air; and that it was essential for the security of the United States to develop a substantial aeronautic industry, so as to have large sources of supplies of aircraft to meet an emergency. They undertook the huge task of getting together the factors necessary to create a large industry. That meant the creating of public and official interest in aeronautics in America; making known to the Allies what American manufacturers could do and to make known to American manufacturers and prospective manufacturers the needs of the Allies. It meant more than publishing a good national technical and trade journal well—it meant also the shaping of courses of events in the industry, the directing of purchases and arranging the financing of manufacturers, and fathering the young industry in a general way, supplying speakers and moving pictures; supplying "pen pictures" of the status of different aspects of aeronautics to government officials, etc.

To do this AERIAL AGE had to establish four separate departments, one to do the national defense work, one to do the "Service and Advisory" work, one to do the regular work of publishing a national technical and trade journal and one to run a "photo and news service" to supply the aeronautic movement and the press and public with special aeronautic information and educational material.

These four departments have been maintained throughout these years and have rendered invaluable services to Country, to the Aeronautic Industry and to the Aeronautic Movement in general.

With a glance backward, over a year of constructive service, AERIAL AGE looks forward to even greater opportunities for its Fourth Year.

Secretary Roosevelt Demands that America Be Made First in the Air

STANDING in the cockpit of a Handley-Page bombing plane and addressing an immense crowd in the Aeronautical Exposition at Madison Square Garden, Franklin D. Roosevelt, Assistant Secretary of the Navy, insisted upon America gaining supremacy of the air not only for defence in event of possible future conflict but for commercial and traveling purposes as well.

While he told of America having originated the science of flying, only to have other countries take its development and control out of her grasp, a De Haviland aeroplane, manned by two American pilots, sailed over the roof of the Garden, its manœuvres directed by wireless telephony, an aerial device also produced by American genius. In the rear of the Garden auditorium the voices of the pilot aloft and of the man directing his operations from the roof could be heard through the amplifier which megaphoned the communications.

"The people of the country have a right to say to the Government that the United States shall remain in the van of aircraft production and enterprise," said Mr. Roosevelt, "but only the interest of the people and its cooperation will make such possible. This exposition shows the future possibilities of aerial navigation, but a united public, thoroughly interested, must back up the manufacturers if America is to keep pace with Italy, France and Great Britain, who are now preparing craft for future use in all conceivable fields.

"Control of the air is necessary in the United States for commercial purposes, for travel and for defense in future possible wars. I hope the public will take sufficient interest to

(*Continued on page 23*)

AERO CLUB OF AMERICA COMMENDED BY ACES JUST RETURNED FROM FRANCE AS AIRMEN'S BEST FRIEND IN MEMORABLE RESOLUTION

TWENTY-FOUR American aviators, headed by Lieut. Col. Thaw, dean of American aviators; Capt. Edward V. Rickenbacker, American Ace of Aces, and Capt. Reed Jean Landis, who has twelve Germans to his credit and ranks next to Capt. Rickenbacker as leading Ace of Aces, and including a large number of the most prominent officers from overseas, surprised Mr. Alan R. Hawley, the President, and other officers of the Aero Club of America on March 10, by presenting them with the following hearty resolution, expressing their opinion of the club's great work for aerial preparedness and the substantial help given to aviators.

Resolution reads as follows:

Whereas the Aero Club of America has, since its foundation in 1905, been the airman's best friend and is to-day the mainspring of the aeronautic movement in this country; and

Whereas before the war Amercan aeronautcs was supported mainly by the Aero Club of America's activities; and

Whereas before America's entry in the war, when the U. S. Army and Navy had less than thirty aviators, the Club, guided by its extraordinary foresight and splendid patriotism undertook to train aviators and form aerial reserves; and through these efforts succeeded in training over three hundred aviators, some of whom went wtih the Lafayette Flying Corps and the others were commissioned in the Army and Naval Reserves, which were authorized by Congress and organized by President Wilson, upon the recommendation and urgings of the Club, and were the first A. E. F. aviators to be sent overseas; and

Whereas the pioneer work of the Club in creating college aeronautic units and fostering interest in aerial preparedness in colleges and universities in 1915, 1916, 1917 and its helpful advice and guidance were directly responsible for bringing thousands of college men into the Air Service; and

Whereas before and after America's entry in the war the Club, by means of energetic national campaigns was responsible for securing large appropriations for military and naval aeronautics and urged unfalteringly the adoption of adequate plans for aerial preparedness; and

Whereas the Club heartily supported the work of the Lafayette Escadrille and Flying Corps, which were organized and supervised by Major Edmund Gros and Lieut. Com. F. H. Allen and generously supported by Mr. W. K. Vanderbilt, all members of the Club; and

Whereas, through its generous offer to pay the salaries of flight surgeons when there was no provision for same, the Club was of great help in establishing the Medical Section of the U. S. Army Air Service, which, when put in operation, resulted in saving hundreds of lives of aviators; and

Whereas the Club organized a Foreign Service Committee in Paris, composed of prominent Americans, members of the Club, residents of Paris, whose high standing in France and personal knowledge of the country enabled them to be of great assistance to American aviators at the front and elsewhere, and visited the American aeronautic centers in France and supplied them as well as aero squadrons at the front with magazines, books, athletic equipment, tobacco and other needs, which greatly added to the personal comfort and well-being of the aviators; and

Whereas the Club soon after America's entry in the war, when there were no American decorations to be awarded for distinguished service, created the Club's Medal of Honor and Merit and Diploma to be awarded for distinguished service; thereby being the first national American body to express in a tangible way the appreciation of the American nation to those who fought at the front for civilization and humanity; and

Whereas, it was the Club's efforts that kept the aviators flying pay from being abolished during the war; and

Whereas during the war the Club, with rare kindness and sympathy, sought to comfort the parents of the aviators who lost their lives or met with accidents, and with great trouble found and supplied information to parents regarding the whereabouts of their sons who were in the Air Service; and

Whereas the Club had created The Airmen's Memorial Fund, for the purpose of erecting a suitable memorial to the airmen who have died and has taken other steps to honor and perpetuate the names of the airmen who fought and died for the cause of humanity and civilization; and

Whereas the employment of aircraft for general purposes has been advanced at least one year because the club had the foresight to make plans for the employment of aircraft for transportation, sport, scientific and civil purposes; and

Whereas the Club contributed and is contributing in many other ways not made public and not mentioned herewith to the upbuilding of our Air Forces, to the attaining of the final victory over Germany and her allies, and to the placing of American aeronautics on a sound, permanent basis;

Be It Resolved that we among the hundreds of others have seen the great value of the Club's inspiring patrioism, progressive work and liberal contributions, herewith express our heartfelt gratitude; and be it further

Resolved that we hereby pledge our hearty support to the Club and its great work; and further

Resolved that a copy of these resolutions duly engrossed be transmitted to each and every member of the Board of Governors of the Club and the Chairman of the Committees and those members of the Club and cooperating organizations who have contributed to the club's splendid work.

The Resolutions were signed by:

Lieut. Col. William Thaw, dean of American aviators; Geo. A. Vaughn, who has ten German machines to his credit; R. S. Landis, son of Judge Landis, with twelve machines to his credit; Capt. Edward V. Rickenbacker, American Ace of Aces; Major Melvin Hall, A. S. A.; Major Cushman Rice, U. S. Air Service, who was in command of the first three Air Squadrons to go overseas; Capt. Herbert S. Mapes, A. S. A.; Lieut. Samuel Mustain, A. S. A.; Capt. Hobert A. Bartlett, Army Transport Service; Lieut. Granville A. Pollock, one of the members of the Lafayette Escadrille, now in the U. S. Air Service; Capitaine Lahoulle, French Ace representing the French government; Capitaine de Fenmestiame, of the French Army; Lieut. Col. Isaac Jones, of the staff of Brig. Gen. T. C. Lyster, Medical Corps, Air Service; Brig. Gen. T. C. Lyster, Medical Corps, Air Service; Major Louis Fisher, Medical Corps, Air Service; Capt. A. J. Boyrivan, French Flying Corps; Ensign D. E. Huger, U. S. N., of the Lafayette Escadrille; Wainwright Abbott, French Flying Corps; Capt. M. Yorsaf, of Guatemala; Ensign T. I. Turner, Ensign C. J. Coatsworth, Jr., U. S. N.; George E. Turnure, Jr. (Lafayette); Lieut. Raymond N. Betey, of the 59th Aero Squadron.

(*Continued from page* 21)

see to it that the Government adopts a definite policy toward the control of the air and the control of building and the cooperation—the friendly cooperation—of the people who are building and of the people who are using private planes.

"Once upon a time, not so very long ago, the United States discovered how to fly, but during the intervening years other nations of the world took up our inventions, and four years ago—even two years ago—they knew a lot more about it than we did, and had done a lot more. But to-day we have got back on even terms, and the question now is, are we going to fall behind again in the race? I have been over on the other side just lately and have seen preparations in England, France and Italy for the development of use of the air, and I must say it is time we need in addition to the efforts of all these manufacturers represented at this exhibit the hearty cooperation and interest of the American public in the promotion of air endeavors."

ADMIRAL SIMS' APPRECIATION OF WORK OF NAVAL AVIATORS

ADMIRAL SIMS, Commander of the United States Naval Forces in European waters, has sent the following radiogram to Mr. Alan R. Hawley, the President of the Aero Club of America:

"Please express to the Naval aviators of America my most sincere appreciation of their courageous and loyal performance of Duty at home and abroad throughout the war. Their brilliant exploits, their determination to win, will ever remain one of the highest tributes to American manhood. The performance of duty of those young naval aviators under my command has not only been in keeping with the very best traditions, but won for America the enthusiastic praise of her Allies."

The radiogram was in answer to a cable sent to Admiral Sims by the Aero Club of America, asking for an expression of appreciation from him regarding the work done by American naval aviators

EXTENSIVE CONTESTS DURING AERONAUTIC CONVENTION AND EXPOSITION AT ATLANTIC CITY, MAY 1st TO JUNE 1st

GREAT enthusiasm and hope for American aeronautics has been created by the Aero Club of America's announcement that the first aerial meet and contests to be held since the beginning of the war and the first dirigible races and kite balloon contests ever held will be held at Atlantic City during the Second Pan-American Aeronautic Convention and Exposition, the program of which is printed elsewhere in this number of AERIAL AGE.

The contests, which are sanctioned by the Contest Committee of the Aero Club of America, under the rules of the International Aeronautic Federation, which govern all aerial contests, are as follows:

The Valentine Efficiency Marine Flying Contest

The prizes (awarded under the terms of the Samuel H. Valentine will) are to be awarded for the greatest number of laps covered in flying over a 60 mile course with the Steel Pier, Atlantic City, as starting point and Cape May Naval Air Station as turning point, during the five Saturdays of the Convention:

First Prize	$1,000
Second Prize	500
Third Prize	250
Fourth Prize	100

The race is to start at 10 A. M. and last until 5 P. M., each of the five Saturdays in the month of May.

The laps start and end at the Steel Pier. Only complete laps count.

Curtiss 1,000 Miles Non-Stop Seaplane Contest

Mr. Glenn H. Curtiss has offered a prize of $1,000 to go to the first entrant for the Curtiss Marine Flying Trophy who covers the distance of 1,000 miles without stopping. The contest for this prize will open on May 1 and continue until it has been accomplished.

The entrants who wish to compete for this prize during the Convention can fly over the 60 miles course between the Steel Pier and Cape May Air Station, and can compete for the Valentine Efficiency Marine Flying Prizes at the same time.

The entrant's record will be counted as a flight for the Curtiss Marine Flying Trophy under the rules for the 1919 competition for this trophy.

Open Seaplane Speed Contest (with handicap)

for 42 laps of 5 miles each. To be held on Decoration Day, May 30.

First Prize	$1,000
Second Prize	500
Third Prize	250

Dirigible Speed Contest (with handicap) for the Aerial League of America Silver Trophy

This contest is open to Army, Navy, Aero Clubs, Colleges and Aeronautic Organizations. It will be held on the afternoon of Saturday, May 3; Saturday, May 10; Saturday, May 17; Saturday, May 24; Friday, May 30; and Saturday, May 31.

Each member of the winning crew of each race will receive a silver plaque of the trophy.

The names of the members of the winning crew of each race will be inscribed on the trophy, which is to be competed for annually.

The race will be for the best speed (under the conditions of the handicap) made at each race.

Aerial Commuting Prizes

(1) To be awarded to entrants who cover the greatest total distance in commuting by air from anywhere to Atlantic City during the period of the Convention.

First Prize	Gold Medal
Second Prize	Silver Medal
Third Prize	Bronze Medal

(Distance to be measured in straight line.)

(2) To be awarded to entrants who make the greatest number of trips in commuting by air from anywhere to Atlantic City during the period of the Convention.

First Prize	Gold Medal
Second Prize	Silver Medal
Third Prize	Bronze Medal

(3) To be awarded to entrants who make the longest flight in commuting from anywhere to Atlantic City during the period of the Convention. (Distance to be measured in straight line.)

First Prize	Gold Medal
Second Prize	Silver Medal
Third Prize	Bronze Medal

Intercollegiate Seaplane Speed Race

Over a five-mile course, for the $2,000 Intercollegiate Trophy.

This event is open to graduates and under-graduates whether in military or civilian life.

Intercollegiate Land Aeroplane Speed Race

To be held on Decoration Day for the $2,000 Intercollegiate Trophy.

This event is open to graduates and under-graduates whether in military or civilian life.

Army, Navy and Marine Corps Contest for Accuracy in Bomb Dropping on a Floating Target

This contest is to be held every Saturday during the Convention and on Decoration Day.

Both land machines and seaplanes are permitted to compete, but slow machines must fly higher than fast machines, to equalize the chances of hitting the target.

First Prize	Gold Medal
Second Prize	Silver Medal
Third Prize	Bronze Medal

An international contest in which the Allied aces already in this country or on their way over would compete, is being considered by the Contest Committee of the Aero Club of America, which includes the following prominent military and civilian authorities in aeronautics and intercollegiate sports: Alan R. Hawley, Chairman; Lieut. Com. P. N. L. Bellinger, U. S. N.; Col. G. C. Brant, U. S. A.; W. Redmond Cross, Lieut. Godfrey L. Cabot, U. S. N.; Walter Camp; Col. Milton F. Davis, U. S. A.; Col. C. de F. Chandler, U. S. A.; Major A. B. Lambert, U. S. A.; Major William McIlvain, U. S. M. C.; Col. James Prentice, U. S. A.; Major J. C. McCoy, U. S. A.; Com. H. C. Mustin, U. S. N.; Lieut. Com. John H. Towers, U. S. N.; Henry A. Wise Wood and Henry Woodhouse.



THE NEWS OF THE WEEK



Informal War Contracts Adjustment Bill Signed

Washington.—President Wilson on March 2d signed the bill validating so-called informal war contracts which had been made by telegraph, telephone or in other ways not "legally" executed. Payment of these contracts had been refused by the Treasury and the new bill therefore validates them and authorizes payment. The contracts that came under the informal classification totaled $2,000,000,000, of which more than $300,000,000 were held by automotive manufacturers. The delay in paying these was said to be one of the chief causes of unemployment, as many manufacturers were unable to secure funds to proceed with peace-time work.

The bill as signed following numerous amendments and revisions in Congress provides the Secretary of War power to authorize payment, allows for appeals from his decision to the Court of Claims, insures that sub-contractors be protected by direct investigation by the War Department of all prime contractor's contracts, and limits the filing of claims under the act of June 30, 1919. The Secretary of War is also ordered to report all payments made under the act at the next session after June 30, 1919.

Those contracts which were properly executed prior to the signing of the bill will come under Class A and the claims will be forwarded directly to the various claim boards handling the respective products called for by the contracts. For example, an ordnance contract, after being prepared for claim in quadruplicate form, will be sent directly to the Ordnance Claims Board, where it will receive an identifying number, be reduced to certificate form embodying the important details and the award made. No awards will be paid until the approval and acceptance of the claimant is secured.

In those instances where the Government officials decide it is best to make direct payments to the sub-contractors who are interested in the contract of a prime contractor this will be done.

Those contracts which have not been reduced to the proper legal form and which are still merely in the form of a telegram or verbal will come under Class B. Special blank forms are provided for reducing these to concrete form. All Class B contracts will come before the Board of Contract Adjustments, which will investigate their proof of claims and refer them to the Bureau Claims Board, Ordnance, Air Service or Quartermaster, as the case may be.

In event a claimant is not satisfied with the award of the Bureau Claims Board he may appeal to the Board of Contract Adjustment.

Swedish Postmaster General Flies from Washington to New York

Julius Juhlin, the Postmaster General of Sweden, who is making a study of the postal service of the United States, and who is especially interested in the air mail service, flew as a passenger in the air mail plane from Washington to New York, leaving at 11.30 and arriving at New York at 2.30, with Pilot Robert Shanks.

Second Assistant Postmaster General Otto Praeger with his air mail staff, J. B. Corridon, L. T. Bussler, J. C. Edgerton and J. A. Jordan, left by train to join the Swedish Postmaster General at the Aeronautic Exhibition at Madison Square Garden on March 10, "Air Mail Day."

Navy Planes Fly from New York to Hampton Roads in Fast Time

Norfolk, Va., March. 7.—Four Navy aeroplanes which left New York City at 10.45 o'clock on the morning of March 7 arrived at the Naval Base, Hampton Roads, early in the afternoon. The first plane arrived at 2.42 o'clock, the second at 2.55, the third 3.02, and the fourth 3.08. Each plane carried three men and all of them report that the trip was made without incident. The first plane arrived nearly forty minutes sooner than expected and the last landed twenty-eight minutes sooner than the first one was due at the Naval Base.

Dayton-New York Record Established

What is regarded by experts as a record for both distance and flying time was made on March 7 by two army officers in a flight in a De Haviland-9 from Dayton, Ohio, to Hazlehurst Field, Mineola, L. I.

Major Ruben F. Fleet, on special duty at Cook Field, Dayton, and Captain Earl F. White, in charge of the field, left Dayton at nine minutes before nine o'clock on the morning of March 7, Central time (nine minutes to ten, New York time), and landed at Hazlehurst Field at ten minutes after four o'clock in the afternoon. The actual flying time, with an enforced stop of about two hours at Newburgh, N. Y., was four hours and thirty-three minutes. The distance covered was 664 miles. The actual air line distance between the two points is 540 miles, but the aviators, steering by compass, got off their course, as was shown by their landing at Newburgh, sixty miles north of New York, and flew an additional 124 miles.

The average speed for the entire distance was about 130 miles an hour.

Reports from Dayton indicated snowstorms throughout that district. The aviators, however, said they encountered no snow. They were hampered at the start by fogs. To overcome this handicap they mounted to an elevation of from 10,000 to 12,000 feet and steered the entire distance above the clouds by compass.

Major Fleet has the distinction of having been the chief of the Aerial Mail Service upon its inauguration between Washington and New York City. He was the first American to learn how to fly by voice commands by radio from the ground. Major Fleet and Captain White relieved each other as pilot of the flight yesterday.

The De Haviland-9 is the product of the Dayton-Wright Aeroplane Company, of Dayton, of which Orville Wright is a director and consulting engineer.

Henry Woodhouse, a director of the Aero Club of America, pronounced the flight "most significant." Records not being available at the time, he could not say whether a record for distance had been established, but he believed it was a speed record for cross-country flight.

Planes Directed By Radio Telephone Over Armory

New York, N. Y.—Under the supervision of Major Henry J. Miller, a squadron of four JN4H planes manœuvred over Madison Square Garden, their movements being directed by orders transmitted by radio telephone from the roof of the Garden. An SCR-67 radiophone transmitter and receiver was used, in charge of Lieutenant C. C. Shangraw, the squadron of planes above being in command of Lieutenant J. Adams. The station on the roof was installed on March 6 and the first demonstration given in the afternoon of that day. Grouped about the apparatus were Harry Payne Whitney, Vance McCormack, Captain Eddie Rickenbacker, Lawrence Waterbury, George F. McLoughlin, who served the Department of Military Aeronautics as aeronautical mechanical engineer and is technical editor of AERIAL AGE; Edgar H. Felix, associate editor of AERIAL AGE, until recently radio engineer in the Signal Corps, where he was concerned with the development of radio telephone and telegraph sets, and several newspaper men.

Atmospheric conditions were not entirely favorable to communication and commands had to be repeated several times. Messages from the planes, however, came in very strong. The planes circled about the city for more than an hour, executing the commands of the officers and visitors to the installation. Voice-commanded flights were continued throughout the exposition.

Aerial Photo Map of New York Made By Army Airmen

New York, N. Y.—A speed test in aerial photography, unique in New York history, was made on March 8 when an army photographic plane in charge of Captain M. A. McKinney, Jr., left Mineola Aviation Field at 1 o'clock flew over the city, photograph Madison Square Garden, the newspaper offices, and various other points of interest.

These photographic plates were rushed by special messenger to the Sixty-ninth Regiment Armory where the army exhibit of the Aeronautical Exposition is housed, for developing and finishing in record time as photographs are finished at the front, and were exhibited at the exposition in the evening.

The photographs were taken by Captain Leroy E. Gahris, wing photographic officer at Hazelhurst Field, Mineola. The pilot will be Lieutenant George McDonald, R.M.A.



© International Film Service

The Leviathan, with New York troops on board, being escorted up the North River by flying boat

Kenly and Crowell Fly to Aero Show In Record Time

Major-General William L. Kenly, with Major Ocker as pilot, flew from Washington to New York on March 6 to attend the Aeronautical Exposition at Madison Square Garden in a De Haviland-4, in the record time for this plane of 1 hour and 41 minutes.

Benedict Crowell, Assistant Secretary of War, Senator Pittman of Nevada, Major M. Connelly and Captain Roy N. Francis, who acted as pilot, made the same trip in a Glenn Martin bomber.

Among other prominent visitors of the day was Rear Admiral Nathaniel R. Usher, who addressed the crowds at the Armory from a platform erected under the F-5-L flying boat.

Augustus Post Reveals Caproni Plans

Caproni has signed a contract to carry passengers and mail between Portugal and Brazil, and probably will begin within two months, Augustus Post, secretary of the Aero Club, said at Amy Grant's Studio, 78 West Fifty-fifth Street, on March 9, in an address on the progress of aviation. It was a benefit to buy musical instruments for the Colonia Reconstruction Hospital at Rahway, N. J.

Just before the armistice was signed, Mr. Post declared, Caproni had a plan whereby General Pershing could send a message from the front to Washington and back within two days. The route would have been from the battle line to Portugal, to the Azores, to Newfoundland, and then to Washington.

Mr. Post announced that a chain of municipal landing fields for aeroplanes soon would be established in the United States, as in France.

General Traub Defends Air Service Before House Committee

Washington, D. C.—Major General Peter E. Traub, who commanded the 35th Division during the Argonne fighting, in testimony before the House Rules Committee, defended the work of th Air Service in France. The official testimony, taken on February 20, was as follows:

"It is claimed that Germany was supreme in her command of the air at the battle of Argonne," said Representative Garrett, of Tennessee. "What about that?"

"You must realize what that battlefront was," said General Traub. "You cannot have planes enough to protect your battlefront at all times. There is no power on God's earth that can protect one against an individual plane. They fly high, perhaps out of sight in the fog or above the clouds, and then swoop down in a few minutes, fire, observe, and then swoop back again. All we can do is to report that there is a plane, ask for protection, and our planes go out and do exactly what the German plane has done."

"Can the criticism properly be made and be sustained that the German dominated the air at all times," asked Representative Pou.

"No, sir," replied General Traub. "At times whole squadrons would be flying over. It all depended upon what the higher command thought as to the movements and need for aeroplanes."

"Then you found no culpable negligence in a shortage of aeroplanes?" asked Representative Harrison, of Mississippi.

"No," said General Traub.

Two Air Records Smashed By American-Built 'Plane

Washington.—Establishment by an American built and designed aeroplane of what officials believe are new world's records for speed and climbing ability was disclosed with receipt by the War Department of results of preliminary tests of a machine constructed at Ithaca, N. Y. The 'plane attained a speed of 163 2-3 miles an hour and climbed 10,000 feet in 4 minutes and 52 seconds.

Government Stock of Hardwood to Be Sold

Washington, D. C.—The War Department authorizes the following statement from the Office of the Director of Sales:

As a result of the recent conference between representative members of the hard-wood industry and representatives of the Office of the Director of Sales in regard to the disposition of the surplus stocks of hard-wood lumber in possession of the War Department, the hard-wood industry has chosen a committee to act with the Government in this matter. The members of the committee are: C. A. Goodman, president of the National Hard Wood Association; Horace F. Taylor and R. M. Carrier, and their function will be to act in an official capacity in disposing of surplus hard-wood lumber owned by the War Department. It is the intention of the War Department to work in conjunction with this committee in offering its hard-wood in such a way that the market for hard-wood lumber will not be unduly disturbed.

N. Y. to Washington By Air in 80 Minutes

Washington, March 6.—After smashing all previous flying records between Washington and New York by covering the distance in 80 minutes in a De Haviland-4 aeroplane, Col. H. A. Dargue of the Bureau of Military Aeronautics and Lieut. Philip Lucas, Adjutant at Bolling Field, landed here at 12.15 o'clock on March 6. It was an official non-stop flight.

The Aeroplane in Agriculture

In connection with scouting and other survey work in Texas the United States Department of Agriculture is putting the aeroplane to its first practical application in agriculture. A try-out of this method of survey was made last year along the Trinity River and resulted in the discovery of several outlaw cotton fields in heavy timber, which had previously escaped detection. This year the aeroplane is to be used more extensively. It has been found a valuable aid in pink bollworm work, as it makes possibel the easy mapping, by means of photographs, of the quarantined territory, and facilitates the inspection work in forested areas, especially in such long stretches of country as the valley of the Rio Grande and its tributaries.

Aero Club of America Honors General Lyster

Brigadier General Theodore L. Lyster, United States Air Medical Service, who served the lives of hundreds of aviators and was awarded the Distinguished Service Medal by Secretary Baker on Tuesday for efficient work in establishing air medical standards and organizing the Air Medical Service in this country and France, was tendered a reception at the Aero Club of America on March 5.

Captain Augustine Lahoulle, French ace; Rear Admiral Bradley A. Fiske, Colonel James Prentice, United States Army Balloon Service; Captain M. Idigords of the Special Guatemala Mission; Captain James Boyriven, the French aviator who flew under all the New York bridges a few months ago; Ensing Daniel E. Huger, U. S. N., late of the Lafayette Escadrille, who holds the French, Italian and American military aviator certificates, were among those present.

President Alan R. Hawley of the Aero Club, in welcoming General Lyster, said he had been told by Allied authorities that when the General and Lieutenant Colonel Isaac H. Jones of the United States Air Medical Service went to France, Italy and England in 1917 and brought to the attention of the Allied Governments the United States Air Medical tests those governments were perplexed by the serious problems of casualties due to accidents. The system offered by General Lyster and Lieutenant Colonel Jones for testing aviators physically and keeping them in good condition solved the most difficult problems and through its application the percentage of casualties from accidents was cut down greatly, Mr. Hawley said.

Reporter-Lieutenant Flies to Aero Show

Leaving Boston at 9.50 A. M. in a Whittemore-Hamm machine, Aviation Lieutenant Theodore Hedlund flew to New York, arriving before 2 o'clock.

The flier is covering the Aero Show for the Boston *Post*. His machine is a new model, built too late to be used in the war. Lieutenant Hedlund saw active service in France, being attached to a squadron engaged in night bombing behind the German lines.



American Aces back from France. Left to right: Capt. Roscoe Fawcett, of Portland, Oregon; Capt. James Normal Hall, of Colfax, Iowa; Major Kenneth P. Littauer, of Washington, D. C.; Lieut. Col. H. E. Hartney, of Washington, D. C., and Capt. Benjamin P. Harwood, of Billings, Mont., all of whom returned on the S. S. Mauretania. Members of the flying corps

The AIRCRAFT TRADE REVIEW

A. E. J.

Porter Opens New York Office

Dayton, Ohio.—Finley R. Porter, who completed his work with the Division of Military Aeronautics on March 1st, will open headquarters in New York at the Engineers' Club on March 6th. R. B. Porter, his son, will be associated with him in his future plans. Mr. Porter's immediate plans call for designs of some heavy engines for transatlantic ships, and after that he will no doubt enter the automobile field again to begin production of the F. R. P. cars in addition to building two or three types of aeronautical engines. Mr. Porter has been with the Bureau of Aircraft Production for the last ten months as chief motor engineer.

Commercial Treaties With South America

Washington, March 3.—The United States is negotiating with the countries of Latin-America to secure uniform recognition and taxes for traveling salesmen representing American firms in those countries. The new treaty has already been ratified with Uruguay and Guatemala, and provides that the business representatives will be accredited by the United States Department of Commerce and given a special single license that will carry them throughout the country they desire to visit without the payment of special taxes in every section as has heretofore been the custom. Provisions also arrange for a schedule to be drawn whereby samples will be admitted, in some instances free of duty, and in others by bond to re-export them within six months of entry.

Aluminum Production Falls 10 Per Cent

Washington, March 4.—Aluminum production in 1918 was valued at $41,159,225, a decrease of $4,722,775, or 10 per cent from the value in 1917. The decrease is due very largely to a decline in the price of that metal during 1918, and does not represent a corresponding decline in quantity of output.

Sperry Wants Enemy Gyroscope Patents

Washington, March 1.—The Sperry Gyroscope Co., Brooklyn, has asked the Federal Trade Commission for licenses to use nine alleged enemy patents covering the manufacture of gyroscopic apparatus. The commission is considering the application.

Stromberg Extra Dividend

The Stromberg Motor Devices Co., Chicago, has declared an extra dividend of 25 cents a share in addition to the regular quarterly dividend of 75 cents a share, payable April 1st, to stockholders of record March 15th.

Texas to Have Aeroplane Company

Dallas, March 5.—Incorporation papers of the Texas Aeroplane Manufacturing Co. will be filed soon. The company will have a paid-up capital stock of $1,000,000, and its purpose is to construct and operate an aeroplane manufacturing plant here. Lt. C. G. Taylor, of Lexington, Ky., is chief promoter of the project.

New York S. A. E. Visits Splitdorf Plant

New York, March 5.—The Splitdorf Electrical Co. invited the Metropolitan Section of the S. A. E. to make an inspection trip through its plant in Newark on March 7th. Automobiles met the party at the station and entertained them at luncheon.

Curtiss Future Plans Broad

With the transition from a war to peace basis practically completed, the Curtiss Aeroplane and Motor Corporation has launched its campaign to establish aerial transportation as a thing of the present.

The Buffalo and Garden City plants are now in operation on peace orders and sales offices have been established at 52 Vanderbilt Avenue, New York City, with Mr. J. P. Davies as sales manager.

Although a young man, Mr. Davies has had considerable experience in salesmanship and office management and, in addition, he has had flying experience both in this country and abroad.

Graduating from the University of Wisconsin in 1913, he entered the life insurance business as general agent for the Northwestern Mutual Life Insurance Company. He organized and developed the first and largest university agency in the United States.

When war was declared, he entered the aviation service and, upon completing his ground school training at the University of Illinois, he was sent to Ellington Field, Texas, as instructor. He specialized in night flying and bombing



J. P. Davies, Sales Manager of the Curtiss Aeroplane & Motor Corporation

work and, early last summer, he was detailed by the Government to visit the fighting fronts in order to study these phases of aviation and to work out a uniform course of instruction for the schools in the United States.

He spent three months abroad, studying French, English and Italian methods.

He returned to America shortly before the armistice was signed and on January 1st he entered the Curtiss organization.

Mr. Davies predicts a great and immediate future for aviation. He believes that the aeroplane industry holds greater opportunity for aggresive young men than any other business in the world.

"Aviation today is often compared with the automobile industry ten years ago," he said.

"As far as the public appreciation of aviation is concerned, it is undoubtedly a very fair comparison, but as far as size of the business and progress in aeronautical engineering, as compared with automobile engineering ten years ago, there is no comparison.

"As a matter of fact, the aeroplane engineering of today is actually ahead of automobile engineering of today and the enormous aeroplane factories bear no resemblance to the small automobile plants of a few years ago.

"The aeroplane completes the transportation facilities by supplementing steamships, railroads, and automobiles. Contrary to the general opinion, it is no more subject to weather limitations than are steamships or automobiles. It has proven itself in peace uses to be as safe, if not safer, than any other form of transportation. As a sport, it combines the fine air of the yacht with the adaptability of the yacht and automobile combined.

"Flying fields are being established all over the world to take care of the commercial developments of the aeroplane and new types of planes are being developed to care for the various problems involved by local conditions in various parts of the country.

"Oil men and ranchers are using the aeroplane to visit distant property and look after their interests, precisely as they have been using high-powered automobiles in the past.

"Business men are using planes to make short trips, thus enabling them, in a good many cases, to save a day or more on each trip.

"First-class mail will eventually be entirely carried by aeroplane; as will all light express. The aeroplane will aid materially in bringing down the prices of food because it will enable the grower in the interior to rush his perishable goods to distant city markets—a thing he is unable to do today unless he is favorably located."

Goodrich Sales Increase 41 Per Cent in 1918

Akron.—Net sales of the B. F. Goodrich Co. for 1918 amounted to $123,470,188, an increase of $36,315,116 over last year.

Personal Pars

Lieut.-Cob. Benjamin Briscoe, of the Briscoe Motor Co., Jackson, Mich., has returned from Europe, where he was in charge of navy aeroplanes, air bases and supply depots.

Samuel E. Ryder, for a number of years in the employ of the Motometer Co., Long Island City, is now affiliated with the Detroit branch of the company opened recently.

Lieut. F. M. Young, formerly in the aviation service, has returned from overseas and is now sales engineer with the Perfex Radiator Co., Racine, Wis.

Capt. A. E. Callanan has been appointed general purchasing agent of the Cleveland Tractor Co. He was formerly in charge of production of de Haviland battle planes at the Dayton-Wright Co., Dayton.

W. B. Folwell has been appointed sales manager of the Stan-Par Axle division of the Standard Parts Co.

G. M. Rymarczick, until recently supervising senior inspector of the magneto section of the Bureau of Aircraft Production, is now connected with the Simms Magneto Co., East Orange, N. J., as production engineer.

Alexander A. Koswick, formerly with the Wright-Martin Aircraft Corporation at their Long Island plant, has accepted a position as an engineer with Ford, Bacon & Davis, in their vluation and report department, with headquarters in New York City.

R. Chauveau, formerly aeronautical mechanical engineer, with the Bureau of Aircraft Production, Washington, has been appointed engineering manager of the Ericsson Manufacturing Company, Buffalo, N. Y.

V. W. Dow, who was formerly sales manager for the American Bronze Corporation, has been appointed New England representative of the corporation, with offices at 348 Tremont Building, Boston, Mass.

S. F. Dupree, formerly vice-president and sales manager, Caskey-Dupree Manufacturing Company, Marietta, Ohio, has been appointed vice-president of the Automotive Products Company, Detroit, Mich.

Joseph Leopold has resigned his commission as lieutenant in the Air Service, U. S. A., and accepted the position of mechanical engineer and sales manager with the Jones-Motrola, Inc., New York City. Prior to the war Mr. Leopold was the chief engineer of the Walker M. Levett Co., New York City.

F. W. Sutton has been appointed chief engineer for the Charles E. Bedaux Company, industrial engineers, Cleveland, Ohio. He resigned as general superintendent of the Dayton Wright Airplane Company, Dayton, Ohio, to accept the new position in Cleveland, and prior to that was production manager of the Continental Motors Corporation.

Fred I. Tone, formerly aeronautical mechanical engineer, research department, Bureau of Aircraft Production, stationed at Dayton, Ohio, has accepted a position with the U. S. Ball Bearing Manufacturing Company, Chicago, Ill.

P. G. Van de Velde, who has been associated with the French High Commission in New York City, has returned to France.

J. G. Zimmerman has been appointed engineer in charge of the ignition development work of the Jefferson Electric Manufacturing Company, Chicago, Ill. He was formerly associated with the technical publicity department of the Splitdorf Electrical Company, Newark, N. J.

Baseball Team to Use Curtiss Planes

The New York National League Baseball Team has been invited by the Curtiss Company, according to information in the press, to fly to Philadelphia on April 23, when they start their series of games at that city. The invitation was extended by Mr. J. P. Davies.

Instruction and Pleasure Flights at Long Island School

The Long Island Aviation Co., of Central Park, Long Island, New York, is not only giving thorough courses in flying but is arranging to take up passengers for flights of reasonable length, giving all the thrills of flying, for a small fee. The field is very conveniently located for motorists.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service

Louis T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service



PILOTS

Ira O. Biffle
Dana C. DeHart
Edward V. Gardner
Lawton V. Smith
Leon D. Smith
Robert F. Shank
Irving Graeb

John A. Jordan, Superintendent, Western Division
Trent C. Fry, Manager, Belmont Park, L. I.
Charles I. Stanton, Manager, College Park, Md.
John M. Miller, Manager, Bustleton, Pa.
O. J. Sproul, Manager, Chicago, Ill.
C. E. McMillan, Manager, Cleveland, Ohio
August Carlson, Manager, Lehighton, Pa.
Harry F. Powers, Manager, Bellefonte, Pa.
William Lindley, Manager, Clarion, Pa.
J. P. Edwards, Manager, Bryan, Ohio
Charles N. Kight, Special Representative

RESERVE PILOTS

Lester F. Bishop
Dan Davison
C. C. Eversole
E. A. Johnson
D. I. Lamb
Frank McCusker
E. H. Lee
Lyman Doty

CHIEF MECHANICS

Frank Tower
Edward C. Radel
Chas. C. King
H. E. Fremming
Albert Cryder

Aero-Mail Speed Record Broken in Washington-New York Flight

Washington.—The quickest trip between Washington and New York ever made in a Curtiss J. N. V. mail 'plane with a 150-horsepower motor was made on February 28, when Aviator Biffle took the aeroplane mail from College Park to Belmont Park, a distance of 218 miles, in 2 hours and 6 minutes flying time. He carried 200 pounds of mail, starting at 11.36 A. M., and arrived at Philadelphia at 12.55 P. M. This lap of 128 miles was covered in 1 hour and 19 minutes.

Leaving Bustleton Field, Philadelphia, at 1.12 P. M., he arrived at Belmont Park at 1.55 P. M. This 90 miles was covered in 43 minutes. The speed between Washington and Philadelphia was 97½ miles an hour and between Philadelphia and New York 125½ miles an hour.

Biplanes to Carry Mail to Ships

New York, March 5.—The Kerr Steamship Co. is to operate a fleet of planes to deliver mail from twenty-four to thirty-six hours after the ships leave port. Mail will be carried in waterproof sacks and will be dropped on deck by the aviators.

Post Office Wants Navy's Capronis

Washington, D. C.—Otto Praeger, Second Assistant Postmaster General, in charge of the air mail, recently said the New York-Chicago service could be put on a regular schedule if the fifteen three-motored Capronis now being used by the Navy Department in France were obtained.

"They are powerful enough to carry a tremendous load of mail, carry a special navigator, as a ship does, and the engines are so arranged that the craft is in no danger of having to descend suddenly because of engine trouble," he said. "We have been trying to get them from the Navy Department, which now seems inclined to store the planes until it needs them.

"Our small appropriation, $850,000 for all air mail, is holding back development. If we had these Capronis the problem would be solved. They are capable of great speed, and we could use them singly for the New York-Chicago flights, making only one stop at Cleveland to overhaul and to pick up and drop mail. These machines would serve until American manufacturers could work out designs that would replace them. If the engines wear out, Liberty motors could be substituted.

"We are confident we can operate the big machines, because in the Washington-New York service our carriers have now flown more than 112,000 miles with only thirty-four forced landings due to engine trouble."

Paris-Lille Mail Service

The aeroplanes engaged in the Paris-Lille mail service which has recently been instituted start from Le Bourget aerodrome. It is expected that this latter service will be resumed at an early date. The machines and pilots engaged have been lent to the postal authorities by the military authorities.

Another Giant Aeroplane

It is now permissible to state that Mr. G. W. Tarrant, of Byfleet, Surrey, England, the manufacturer of the famous Tarrant army huts, is constructing a huge triplane with a wing span of 150 feet and a length of 75 feet. It will be fitted with six engines, developing in all 3,000 horsepower, and it is expected to show a speed of 80 to 100 miles an hour for a 500-mile flight. The machine was originally designed as a bomb-carrier, but it has been adapted to carry passengers or cargo.

Should an attempt be made on an Atlantic crossing, cargo and passenger carrying space will be sacrificed for a provision of extra gasoline tanks of sufficient capacity to give the machine the necessary range of action.

UNITED STATES POST OFFICE AIR MAIL SERVICE

Consolidated Report of Operation and Maintenance

MAY 15, 1918, TO JANUARY 1, 1919

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND UNIT COST: Gallon of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
														hr. min.				
1	$539.36	$105.71	$159.31	$178.55	$157.60	$335.70	$961.86	$782.36	$2,747.48	$401.77	$422.48	$6,792.18	1826	127 29	10253	5.61	$53.27	$ .6624
2	486.82	116.19	157.54	178.53	157.60	335.71	843.96	861.48	427.66	401.78	422.48	4,439.75	1598	109 14	8389	5.38	40.64	.5292
3	131.50	41.14	51.90	147.21	118.05	274.45	245.32	356.47	140.69	299.81	308.99	2,115.45	465	28 48	2345	5.04	73.44	.9021
4	458.18	104.91	163.67	178.53	157.60	238.42	823.36	890.49	427.89	401.78	422.47	4,364.59	1502	110 15	8028	5.34	39.58	.5436
5	317.58	78.24	131.22	178.53	157.61	335.71	613.80	827.47	516.08	401.79	422.47	3,980.50	1082	78 46	4389	4.05	50.53	.9069
6	283.52	81.62	109.00	115.49	124.12	215.96	540.40	728.03	433.85	331.67	337.16	3,300.82	935	61 49	4944	5.28	53.39	.6676
37944	15.75	2.71	11.73	12.40	22.06	2.66	48.41	129.99	9.77	27.56	16.66	299.70	62	7 19	550	8.88	40.96	.5449
38262	414.27	117.88	194.42	369.21	212.26	398.10	749.03	1,058.93	2,084.85	565.68	526.23	6,690.94	1351	105 47	6629	4.90	63.25	1.0093
38274	777.40	215.19	205.25	369.21	122.27	398.10	1,023.36	1,400.98	1,610.81	565.68	526.23	7,304.48	2558	190 16	12734	4.98	38.38	.5736
38275	504.22	140.32	223.02	369.22	212.26	398.09	644.73	1,259.60	1,478.43	565.69	526.22	6,326.80	1660	112 03	7371½	4.44	56.46	.8583
38276	191.01	60.70	46.13	190.68	54.66	62.38	321.57	587.69	270.44	163.92	103.78	2,052.96	632	51 34	3401	6.04	39.81	.6036
38278	619.44	181.13	178.88	369.20	222.29	398.10	864.99	1,609.16	463.74	565.70	526.23	5,989.36	2025	151 02	10583	5.22	39.65	.5659
39362	251.62	45.52	123.03	325.50	150.65	334.17	245.65	782.57	1,593.45	436.17	396.08	4,684.41	776	24 00	1901	2.45	19.51	.2464
39363	357.84	34.94	116.26	325.50	150.64	334.18	312.69	681.26	56.58	436.15	396.09	3,202.13	1139	38 42	3307	2.90	82.74	.9682
39364	43.95	2.79	49.51	163.95	101.39	156.96	184.86	228.36	2.63	294.62	255.48	1,484.50	146½	3 52	329	2.25	38.38	.4512
39365	341.25	48.88	138.20	344.92	182.65	388.51	304.12	850.93	242.90	485.57	464.73	3,792.63	1062	42 16	3920	3.69	89.64	.9675
39366	503.12	69.62	124.93	285.06	127.74	243.43	511.81	822.50	667.25	336.01	302.57	3,994.04	1672½	90 35	8098	4.84	44.08	.4932
39367	350.80	20.41	70.82	309.54	139.30	239.57	427.95	657.30	832.36	388.94	329.59	3,766.58	1201	46 00	3919	3.26	81.84	.9611
Total....	$6,587.63	$1,467.90	$2,254.82	$4,411.23	$2,660.75	$5,090.20	$9,667.87	$14,51557	$14,006.86	$7,070.29	$6,705.94	$74,581.82	21683	1379 47	101090	4.66	54.05	.7377
Average per Mile	$.0651	$.0145	$.0223	$.0436	$.0263	$.0503	$.0956	$.1435	$.1385	$.0699	$.0663							

Planes 1 to 6, inclusive, are Standard type JR-1, with 150 H. P. Hispano-Suiza motors.
Planes 37944, 38262, 38274, 38275, 38276 and 38278 are Curtiss type JN-4-H, with 150 H. P. Hispano-Suiza motors; and
Planes 39262 to 39367, inclusive, are Curtiss type R-4-LM, with 400 H. P. Liberty motors.

OTTO PRAEGER, Second Assistant Postmaster General.

THE FUTURE OF AERONAUTICS

By G. DOUGLAS WARDROP

THE verdict of the Aeronautic Exposition is that a great volume of business awaits the aeronautic manufacturers whose product will satisfy the demands of the critical public interested in sport and commercial aerial transportation.

Alike in industrial matters and military operations the time element is the supreme factor, and success or failure is finally determined by rapid decisions, which, more often than not, are irrevocable. In either case there usually arrives a moment, when, however promising the initial stages may have appeared, the issue hangs in the balance; the scales are wavering and the slightest weight added will incline them definitely to one side or the other. The critical moment has now arrived for the aircraft industry, whose future for some decades to come depends upon the decisions which must be taken now. Six months hence it will be too late. Inaction at the present time would be fatal.

Energetic action must be taken promptly; things must not be allowed to drift; a settled policy regarding the future must be laid down. The Air Service is in process of demobilization, and those who are going, or have gone, are amongst its best men. If the investment of time and the knowledge acquired by these men is to be properly capitalized, the industry must show definite reason why those men should maintain and sustain their interest.

The absence of all information regarding the future Government policy towards aerial transport is already causing the industry grave embarrassment. It is acknowledged on all hands that for some years to come the aircraft industry cannot be self-supporting without the assistance of the State, and that some considerable time must elapse before commercial aerial transport can be made to pay. Such support has repeatedly been officially promised, but until now has failed to materialize; and while war contracts are being liquidated wholesale, the ban on civil flying still remains, and the aircraft industry is living from hand to mouth, subsisting on an unsubstantial diet of uncertain hopes.

It may be thought that time will cure this uncertainty and provide the basis for a stable policy. But such is not the case, for in a rapidly progressive science such as aeronautics time once lost can never be wholly regained. Not only is the present highly efficient industry beginning to disintegrate and to turn its activities into other channels, but its highly skilled technical staff, which at present has no equal throughout the world, is rapidly dispersing and becoming absorbed in other industries. And once it has dispersed, it will never come together again, but will be finally lost to aeronautical science. So long as the future of the industry remains uncertain, so long will it fail to attract the best men who can find a more profitable and a securer career elsewhere.

Congress Being Out of Session, Government Action Delayed

The great problems of aerial transportation have but lightly been touched, but they have been touched sufficiently to demonstrate their immense possibilities to mankind and civilization.

Nothing is more important at this time than to stabilize the aeronautic industry, and it is necessary to do so quickly, before aeronautic talent and trained aviators and skilled labor look elsewhere for positions.

The Government should be the main factor in stabilizing the aeronautic industry, at least for the next six months, while the plans for the employment of aircraft for special purposes are put into effect. Unfortunately, Congress is out of session, and there seems to be no prospect for an extra session to be called on time to insure Government action on the aircraft situation in time to benefit the aeronautic industry this year.

Atlantic City Convention and Races Aeronautic Industry's Best Asset

The one month Aeronautic Convention, Exposition and Races to be held at Atlantic City from May 1 to June 1, inclusive, are the aeronautic industry's best assets.

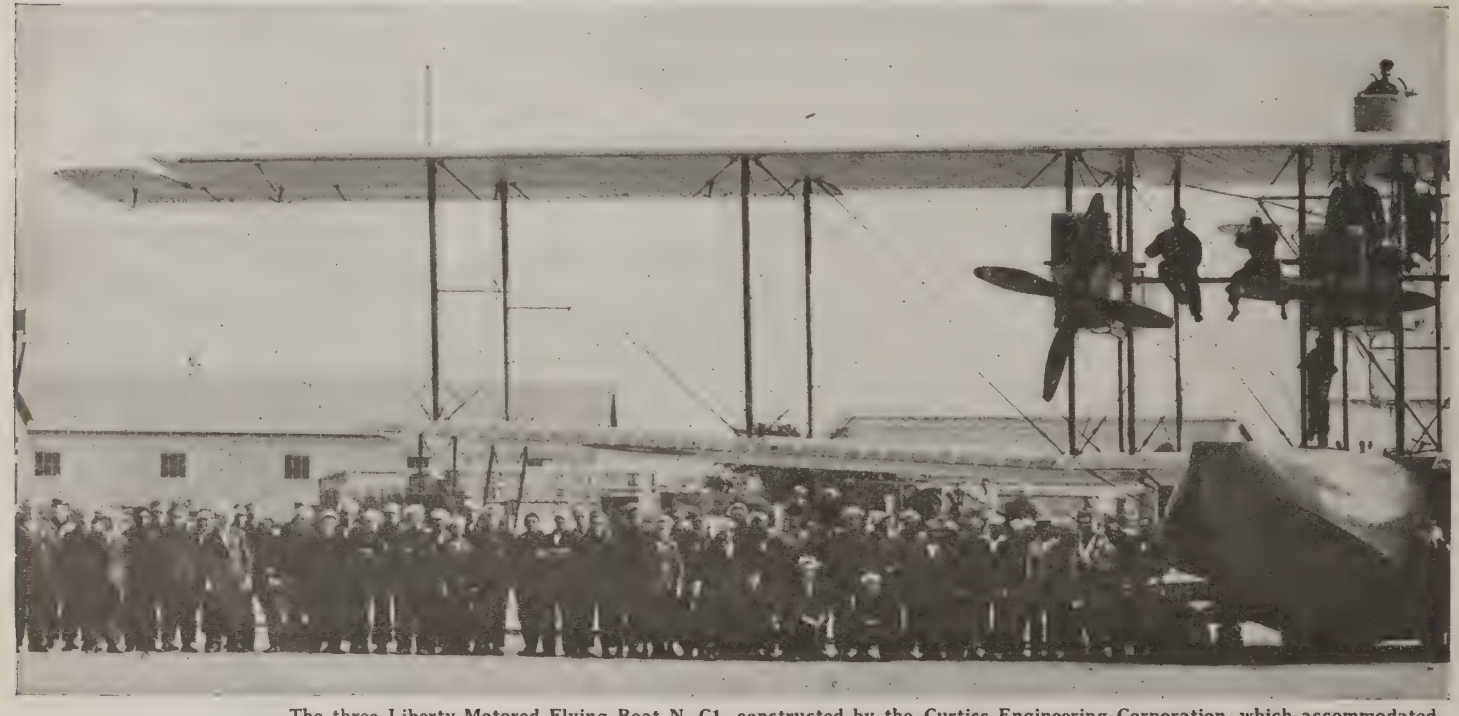
With the convention there will be held aeroplane, seaplane and dirigible races and other demonstrations, together with an extensive Aeronautic Exhibition.

The Convention and Races are to be held under the auspices of the Aero Club of America, the Aerial League of America and the Pan-American Aeronautic Federation.

The Governments of all the Allied and Latin-American countries and their aeronautic, sporting, scientific, industrial and educational organizations are invited to send commissions to the covention.

The races to be held each Saturday will include:

(1) Seaplane Contests (general)
(2) Curtiss Marine Flying Trophy and Prizes
(3) Intercollegiate Seaplane Contests
(4) Land Aeroplane Contests
(5) Dirigible Contests
(6) Kite Balloon Speed in Ascending and Descending and Maneuvering Contests
(7) Parachute Competition.
(8) Aviette (bicycles and motorcycles with wings) Contests.



The three Liberty-Motored Flying Boat N. C1. constructed by the Curtiss Engineering Corporation, which accommodated

The Daily Program for the thirty days will comprise:

(1) Exhibits of aeroplanes, motors and accessories on the Steel Pier.
(2) Demonstrations and tests of seaplanes, land aeroplanes, motors, dirigibles, kite balloons to prospective customers.
(3) Aerial passenger carrying by seaplanes and dirigibles and kite balloon ascensions.
(4) Moving pictures and addresses on most important phases of aeronautics.

The convention aims, for the first time in the history of aeronautics to permit thorough discussion of each of the important phases of aeronautics, so that people interested in each phase may acquire all the information available on the subject.

The program is most thorough and complete. Tens of thousands of people of different lines of endeavor related to aeronautics are invited to attend. For instance, on the fifth day, when "The Large Dirigible and Its Value for Transportation" is discussed, there are invited the representatives of railroads, express, steamship and other transportation organizations to attend.

For the illustrated addresses on "Aerial Forest Patrol" the Forestry Department of every State are invited to attend. For the discussion of the "Work of Aerial Police Squadrons, and Why Every City Should Have One," the police commissioners are all invited.

For the illustrated address on, and consideration of, "Aerial Mail Plans," the Chairman of Post Office and Post Roads Committees of House of Representatives and Senate and Postmaster General Burleson and 26,000 United States Postmasters and Chambers of Commerce of 13,000 cities are invited to attend.

Likewise for the illustrated addresses on the "Need of Municipal Aerodromes and the Part to Be Played by Aircraft in City Planning," the Chambers of Commerce and City Planning Commissions are invited to attend.

For the Presentation of the Flags by each State of the United States to the Aero Squadrons representing the States, all the States and Cities are invited to send delegates, and the Army, Navy and Marine Corps to send representatives.

For the Demonstrations and Illustrated Addresses on the "Value of Aircraft for Advertising by Day and Night," all national advertisers and advertising agents are invited to attend. For the discussion of "Pan-American Aerial Transport," the commissions of the twentyLatin-American Republics are invited to attend.

For the addresses on 'Aerial Photography," all the photographers, professional and amateur, and makers of photographic apparatus are invited to attend.

For the discussion of "Aerial Navigation Instruments for Flying Over Land and Water," aviators, navigators, scientific instrument makers and aeronautic experts are invited to attend.

For the addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey," all people interested in exploration and surveying are invited to attend.

For the addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators," all the Insurance Companies and agents are invited to attend.

For the addresses on "Aerial Jurisprudence—Aerial Laws and Regulation of Air Traffic," all lawyers, traffic commissioners and police authorities of different countries are invited to attend.

For the Aeronautic Art Day, when an address on "Aerial Painting and Sculpture of Different Countries" will be delivered and exhibition of aerial paintings by Lieut. Farre and Lieut. Rutan and others, all the prominent artists, managers of art galleries and art patrons are invited to attend.

The engineers are invited to attend engineering week, when basis problems of aeronautic engineering are to be considerd.

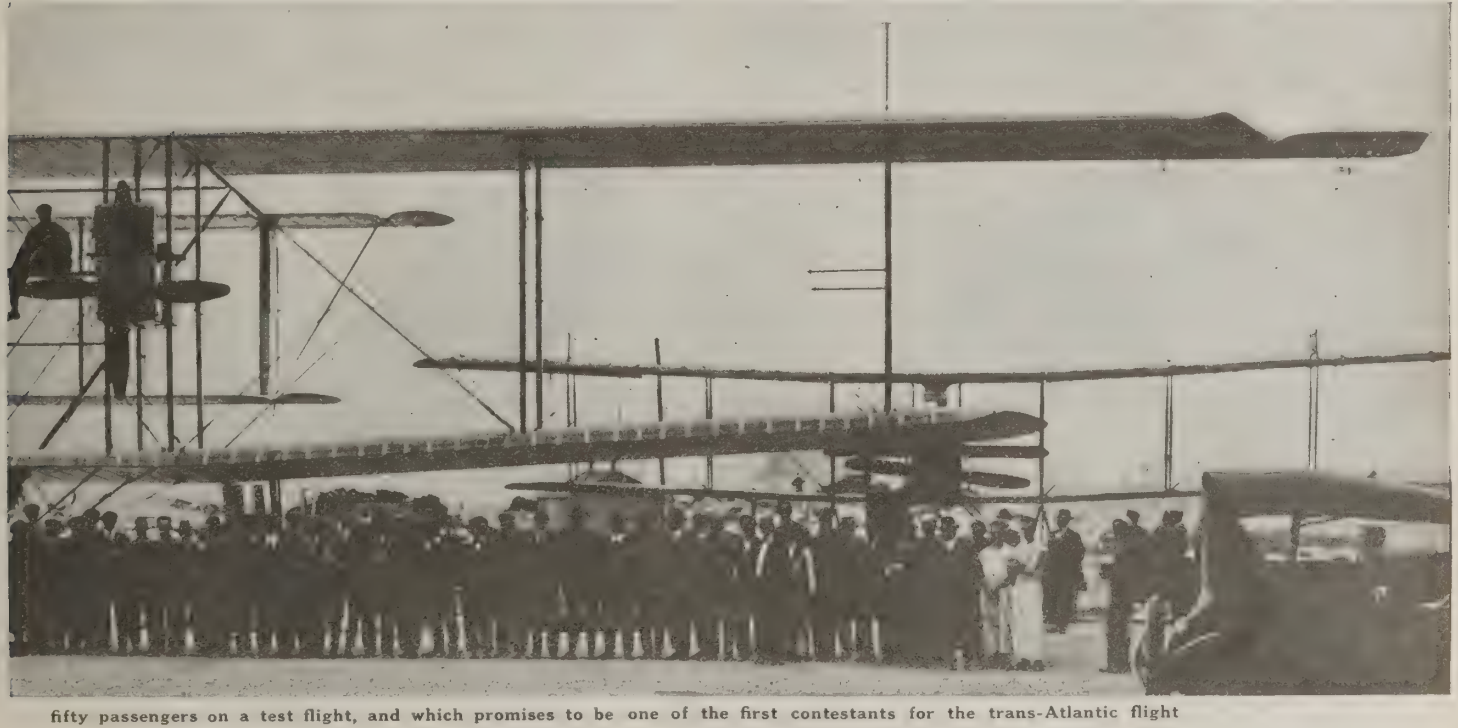
For the discussions of "Meteorology—How the Weather Forecasts Can Be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation" and "Telegraphic and Climatic Factors in Relation to Aeronautics," people interested in the subjects are invited to attend.

For the discussion of "International Medical Standards for Aviators in War and Peace," when reports from different countries will be presented by the highest authorities on the subject, 50,000 medical men are invited to attend.

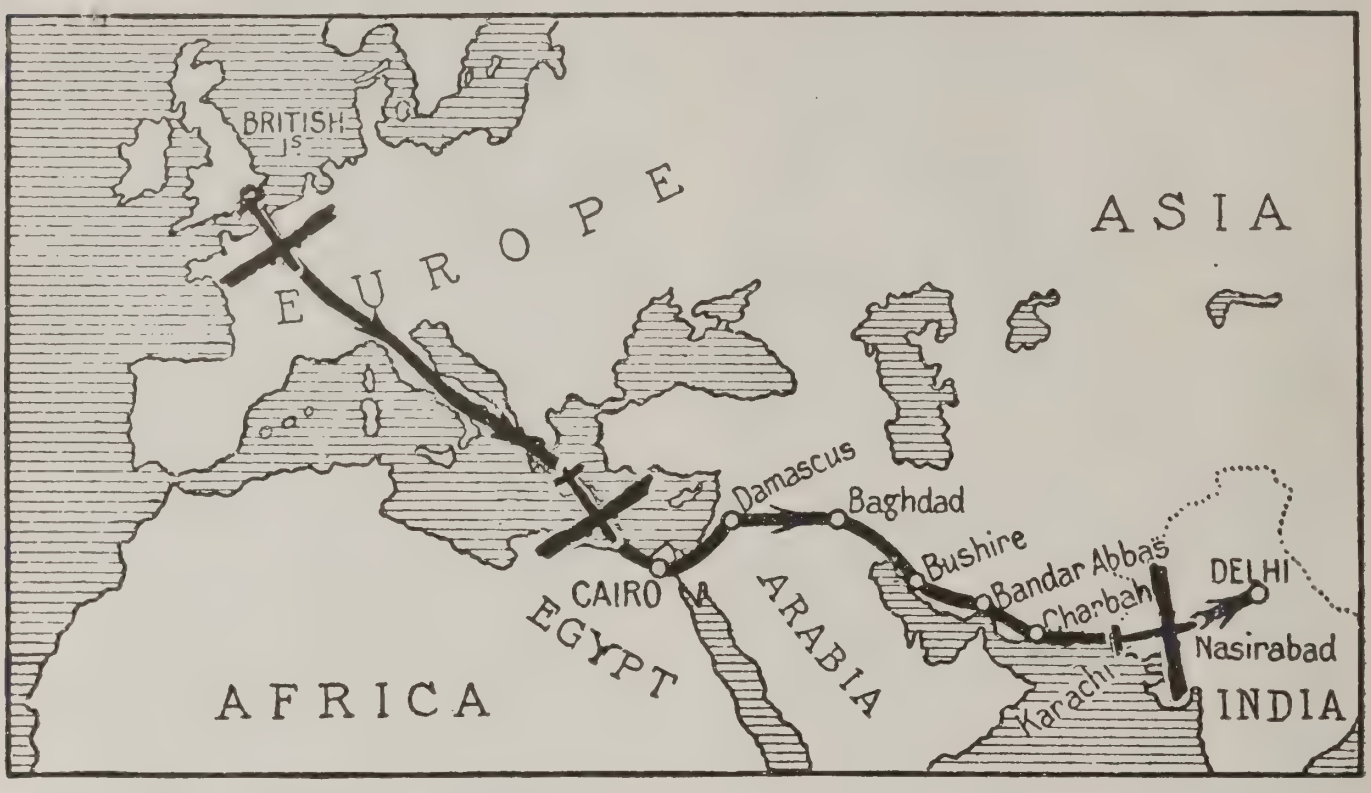
The Aerial Mail Service

The Aerial Mail Service was inaugurated May 15, 1918, and during the first six months of its existence its operations covered 68,892 miles, at a cost of $75,165.94, including 6 per cent on investment and 33 1/3 per cent for depreciation. In that period it carried between Washington and New York 7,452½ pounds of aeroplane mail. The revenue derived was $60,653.28. The net deficit, not taking into account the 6 per cent interest on investment, was $8,969.08. In addition to the aeroplane mail carried there was dispatched between Washington, Philadelphia and New York in the six months' period a total of 91,926½ pounds of first-class mail, aggregating 3,667,040 letters. This mail was advanced in dispatch from 6 to 12 hours, which many times made up for the small deficit in the operation of this service. This ordinary mail was letter mail from distant States, which was carried in addition to the aeroplane mail. Thus the ordinary mail put on the planes at Washington was usually mail from the South Atlantic Coast States and the Gulf States, distributed to carriers by the Railway Mail Service before reaching Washington, and by reason of aeroplane dispatch was delivered in New York on the same afternoon instead of the following morning.

The Washington-New York route was established not as a typical commercial line, but to solve the problems that had to be met to establish a daily dependable schedule. The flying



fifty passengers on a test flight, and which promises to be one of the first contestants for the trans-Atlantic flight



The remarkable flight of Major-General W. G. H. Salmond, Captain Ross Smith, British Air Force, and two mechanics, from Cairo, Africa, to Delhi, India, a distance of over 3,000 miles

record made on the New York-Washington line has never been equaled in the history of aviation, and its operation by civilian flyers of the Post Office Department has far exceeded its operation while under military control, the civilian fliers having a record of but 7 forced landings in 100 consecutive flights and only 2 failures in that time on account of fog or storm conditions. The mail has been carried in blinding rain and hail, on fog-bound days with visibility of not over half a mile, and in the face of gales. Only two winter gales were strong enough to prevent the aeroplanes from completing their journey. On Thursday, January 23, the mail was brought south as far as Silverside, Del., in the face of a 65-mile gale at an altitude of a few thousand feet.

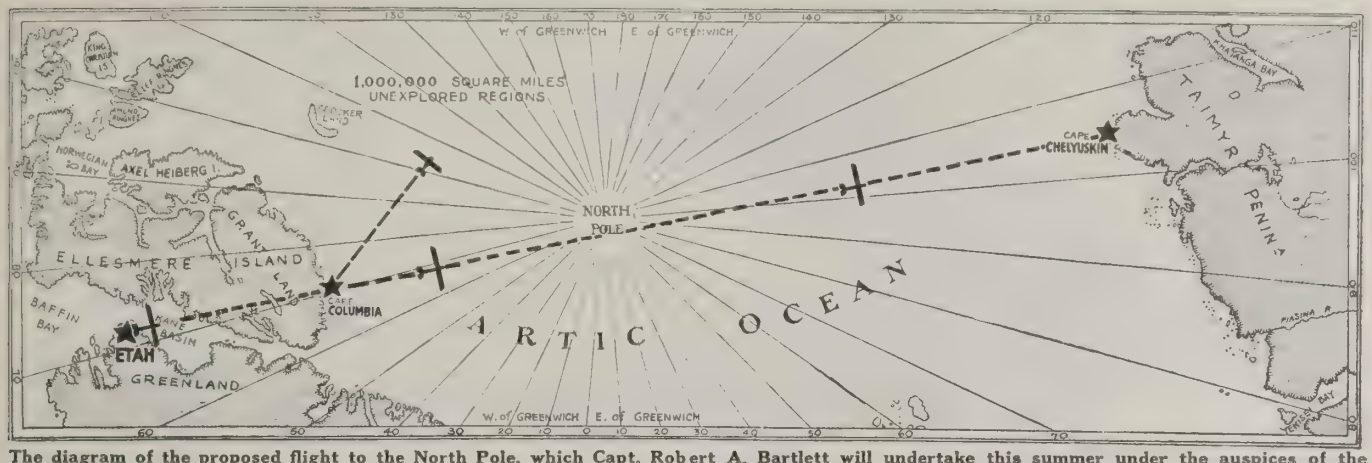
The fastest time of flight, carrying the mail from College Park to Belmont Park, N. Y., a distance of 218 miles, was 1 hour and 30 minutes, and the slowest time for a continuous flight was 4 hours and 56 minutes. The average time is 2 hours and 40 minutes. The common experience of the users of aeroplane mail is that a letter posted in the down-town station in Washington as late as 10.50 a. m., and leaving the aviation field at 11.30 a. m., is usually delivered between 4 and 4.30 in the afternoon, which is in ample time before close of business.

The greater the distance between the points on an aerial mail route the greater is the service rendered to commerce and the greater is the patronage of the line. A mail service leaving New York at 6 in the morning and arriving in Chicago before 3 o'clock in the afternoon, in time to connect with carrier deliveries, will advance the mail between the two cities by 16 hours over any train dispatch that can be made after the departure of the Twentieth Century Limited from New York at 2.45 p. m. The department desires to establish this line immediately and extend it west to the foot of the Rockies during the coming fiscal year, with the view of reaching the seaports of Seattle and San Francisco, if Congress authorizes the appropriation necessary. The air mail time between New York and San Francisco will be less than 40 hours. It is desired that this transcontinental trunk line shall be tapped by lines from Minneapolis, St. Paul, St. Louis, Kansas City and other points, and ultimately by a line from Boston, via Albany, Buffalo and Detroit, to Chicago.

A north and south trunk line from Boston to Atlanta should



The Kite Balloon was an effective observation unit in the Great War—it can be made an



The diagram of the proposed flight to the North Pole, which Capt. Robert A. Bartlett will undertake this summer under the auspices of the Aero Club of America

likewise be established with an ultimate extension from Boston to Montreal, Canada, and from Atlanta, via Key West, to Havana. Based on the accurate cost accounting kept in the operation of the Washington-New York air mail line, the cost of an east and west trunk line from New York as far as Omaha and a north and south trunk line from Boston to Atlanta has been carefully estimated at $1,600,000. To this should be added $400,000 for several essential feeders that would connect up Detroit, Minneapolis, St. Paul, St. Louis, Kansas City and other points, and would admit of an extension as far west as Salt Lake City, this extension, however, dependent upon the extent to which the Government equipment can be transformed into strong and safe mail-carrying machines.

Aerial Program of Foreign Countries

Italy: (1) Civitavecchia-Terranova, Sardinia (150 miles). Daily mail service by means of flying boats. Inaugurated June 27, 1917; temporarily discontinued during the winter of 1917-18; reopened in March, 1918. Average time, 2 hours. (2) Venice-Trieste (170 miles). (3) Venice-Pola (80 miles). (4) Ancona-Fiume (130 miles). (5) Ancona-Zara (90 miles). (6) Brindisi-Cattaro (150 miles). (7) Brindisi-Valeona (100 miles).

Organized shortly after the signing of the armistice with Austria; operating: (8) Genoa-Nice (100 miles). (9) Genoa-Florence (120 miles). (10) Florence-Rome (140 miles). (11) Rome-Brindisi (290 miles).

Air mail lines (8) to (11), now being worked out, will constitute the Italian section of an interallied air mail service to be established between London, Paris, Rome and Constantinople.

France: (1) Paris-Mans-St. Nazaire (250 miles). Daily mail service by means of twin-engined Letord biplanes (Hispano-Suiza engines). Inaugurated August 15, 1918. Average time, 3 hours. Postage 75 centimes (15 cents). (2) Paris-London (240 miles). (3) Paris-Lyons (240 miles). (4) Lyons-Marseilles (165 miles). (5) Marseilles-Nice (140 miles).

Air mail lines (3) to (5), now being organized, will constitute the French section of an interallied air mail service to be established between London, Paris, Rome and Constantinpole.

(6) Nice-Ajaccio, Corsica (150 miles). Daily air mail service by means of flying boats about to begin operations.

Various air mail lines, operated by the military, are functioning in southern Algeria and Morocco, chiefly for carrying official correspondence. The organization of an air mail line from Marseilles via Algiers to Timbuctoo is now being worked out. The sections, Biskra-Wargia (240 miles), and Wargia-Inifel (211 miles) and Inifel-In Salah (223 miles), are in operation.

Great Britain: (1) London-Paris (240 miles). Daily passenger service, weather permiting, by means of twin-engined DH-10 biplanes. Now being jointly organized by the Aircraft Transport & Travel (Ltd.) of London, and the Compagnie Generale Transaerienne, of Paris. Average time, two and one-half to three hours.

Greece: (1) Athens-Janina (200 miles). Daily mail service; inaugurated August 8, 1918. (2) Athens-Salonica (220 miles). Daily mail service projected.

Denmark: (1) Copenhagen-Odense-Fredericia-Esierg (170 miles). (2) Copenhagen-Kalundborg-Aarhus (105 miles). (3) Copenhagen-Gothenburg-Christiania (330 miles). Daily mail service projected.

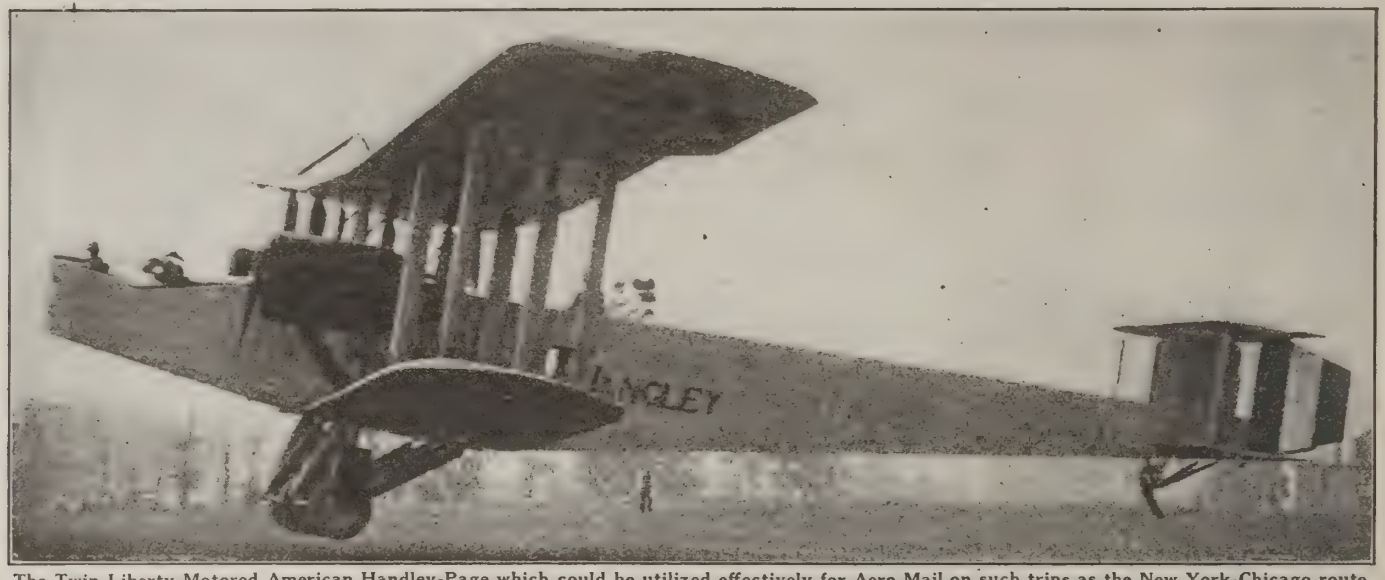
Austria: (1) Vienna-Budapest (140 miles). Daily mail service, inaugurated July 5, 1918. Postage, 5.10 kronen ($1).

Norway: (1) Christiania-Stavanger-Bergen-Trondhjem (670 miles). Oversea route. (2) Christiania-Bergen (200 miles). Overland route. (3) Stavanger-Bergen (100 miles). Oversea route.

Projected air mail lines to be operated by the Norvegian Air Routes Co.: (4) Stavanger-Aberdeen, Scotland (320



equally effective adjunct of the Meteorological office in connection with weather forecasting



The Twin-Liberty-Motored American Handley-Page which could be utilized effectively for Aero Mail on such trips as the New York-Chicago route



The Glenn L. Martin twin motored biplane, the manufacturers of which are now offering to construct similar machines for pleasure and commercial cruising

miles). Projected air mail line to be jointly operated by the Norvegian Air Routes Co. and Aircraft Transport & Travel (Ltd.), London.

Spain: (1) Madrid-Barcelona (320 miles). Barcelona-Palma Balears (170 miles). Projected air mail lines to be operated by a Spanish company.

Future of American Aerial Mail

A comprehensive plan for the development of the U. S. Aerial Mail Service has been adopted by Postmaster General Burleson.

This program directs, first, the establishment of an aerial mail service, connecting the principal commercial centers of the country by a system of trunk lines and feeders, and, secondly, connecting this country with the West Indies and Central and South America. The trunk lines and feeders decided on under this program are:

1. New York to San Francisco, with feeders from—
   - *a* Chicago to St. Louis and Kansas City,
   - *b* Chicago to St. Paul and Minneapolis,
   - *c* Cleveland to Pittsburgh.
2. Boston to Key West, with feeders from—
   - *a* Philadelphia to Pittsburgh,
   - *b* Washington to Cincinnati,
   - *c* Atlanta to New Orleans.
3. Key West via Havana, to Panama.
4. Key West, via the West Indies, to South America.

On this program Postmaster Burleson reports progress as follows:

(1) Boston to Key West—Of this route the Washington-New York division has been operated since May 15th and is functioning perfectly.

The Boston-New York division has been tentatively laid out and will be established as soon as sufficient funds and planes are made available.

The Washington-Atlanta and Atlanta-Key West routes are now being worked out with a view to their early establishment.

(2) New York to San Francisco—Of this route the division from New York to Chicago has been carefully worked out. The War Department, under act of Congress of July 2, 1918, has released to the Post Office Department, for the use of this division, aeroplanes of 650 pounds mail carrying capacity, which are no longer suitable for war needs. The hangars have been ordered, landing fields obtained, and the route has been ordered established before the close of the present year. In a series of aeroplane flights by the Post Office Department, early in September, the route was carefully charted for emergency and regular landing fields. In this work one aeroplane made a record flight from Chicago to New York in less than fourteen hours, including all stops en route. The flights were made through storms and heavy rains over parts of the route. The reconnaissance developed that it will be feasible to maintain a nine-hour schedule between New York and Chicago, as compared with the twenty-one-hour schedule of the Twentieth Century Limited. The New York-Chicago schedule for the present will call for departing from New York at 6 a.m., and arriving at Chicago about 3 p.m., thus connecting with all city deliveries. The principal mail stop will be Cleveland. The time between Chicago and Cleveland will be cut to 3 hours 45 minutes, and between New York and Cleveland to 5 hours 15 minutes. Mail from the Atlantic Seaboard will be advanced from 12 to 24 hours to the West and Southwest by this new service. The feeder routes from Chicago to St. Louis, Kansas City, St. Paul, Minneapolis, and the remainder of the trunk line from Chicago to San Francisco will be worked out during the ensuing year, with a view to their early inauguration.

(3) Key West to Panama, and

(4) Key West to West Indies and South America—Negotiations looking to the conclusion of special aerial mail conventions between the United States and the foreign countries involved for the establishment of these routes to the West Indies and Central and South America are now in progress. It is realized that these oversea routes will require the most powerful aeroplanes with wireless installation and special construction to make them safe over the seas, but the enormous commercial advantage that will result by materially reducing the time between this country and Central and South America will justify the expenditure that such a service will entail.

It is a stupendous plan, which opens the great airways of South and Central America and Canada—the maps and details of which have been worked out and are to be published in *Flying* in the near future.

This is the dawn of the Aerial Age, when those of us who have assisted the development of aeronautics for—well, a lifetime—will see things happen such as we never dared to hope.

Aerial Transportation Lines Planned the World Over

Aerial transportation lines were planned while the war was still on, and the plans began to be put into effect soon after the signing of the armistice.

Thousands of aerial transportation lines are being planned, a few of which are quoted herewith:

(1) From London to Salonica, by way of Nice, Rome, Brindisi and Vallona.

(2) From England to the United States, proposed by Lord Morris, who has championed the project in Parliament.

(3) From Spain to the United States, proposed by Captain Herrera, chief of the Spanish Air Force, which has been discussed by the Spanish Cabinet and is understood to have the approval of King Alfonso of Spain.

(4) From the United States to England, proposed for next June by Captain Benjamin B. Lipsner and a group of other very public-spirited men, who are planning to establish a number of aerial transportation lines in the United States.

(5) Between Australia and London, proposed at a meeting



In carrying out international aerial laws the "aerial police," international or national, will, no doubt, have to use "aerodrome ships," which will house the aeroplanes needed at sea to "head off" aeroplanes of doubtful identity or "pirates of the air" and other lawbreakers. On receipt of a wireless message that the lawbreaker is at large, the planes will be sent up from the aerodrome ship, just as they were sent up daily to head off the German air raiders during the war. In this case the aerial policeman will order the lawbreaker by radio phone to land at a given aerodrome. If it fails to fly in the direction indicated, the "policeman" will probably fire at the motors, to cripple the 'plane and force the lawbreaker to obey. The photograph shows the British aerodrome ship "Furious," which is reported to be 800 feet long, 30,000 tons displacement



First Aerial Fire Fighters during the huge blaze which wiped out many of the new barracks at Camp Mills, Long Island, about noon December 11, 1918, Lieut. Carroll and Lieut. Welsh flew their planes through the thick clouds of rolling smoke and at a very low altitude poured the contents of fire extinguishers over the burning buildings. In spite of the intense heat, both pilots kept within two hundred feet of the conflagration and found very little difficulty in overcoming the immense "bumps" which tended to throw the ship out of control. As the flames were gotten under control, Lieut. Carroll was able to secure several good aerial photographs of the blaze



The "Felixtowe Fury," the Porte triplane flying boat. This monster flying boat, the largest in existence, is a British machine with British engines. It is fitted with five Rolls-Royce "Eagles" engines arranged in tandem sets and one single "pusher" propellers in the tandem sets are four-bladed, and the others two-bladed. The total span of the wings is 123 feet; the length of the fuselage, 60 ft.; the height from keel to ring post, 27 ft. 6 in.; and the total weight 23,400 lbs.—R.A.F. Official Photograph

of business men at Sydney on October 2. The aerial service would take only 150 hours for the trip.

(6) From London to everywhere, proposed and being carried out by Holt Thomas, the managing director of the British Aircraft Manufacturing Company, who explains his plans as follows: "We are opening air routes all over the world in conjunction with local companies. In France we will operate in connection with a French company, and already arrangements for such a service are practically completed in Norway, Denmark, Italy, India and Africa. Later we will extend the service to Japan, China and the West Indies."

(7) From India to other parts of the British Empire, proposed by the Government of India as a postal service.

(8) From India, via Alexandria, and the Red Sea to Australia, via Cape Town, to New Zealand.

(10) From London to Brindisi, by way of Paris, Lyon, Marseilles, Turin, Florence, Rome.

(11) Across the Sahara Desert from Algiers to Biskra, Ouargla, Bourassa, Timbuctoo, Koulikoro and Dakar.

(12) The British Civil Aerial Committee, like the United States Post Office and the Aero Club of America and the Aerial League of America, has planned air lines to every direction of the compass, by aeroplane and dirigible. A report made public on December 13 says, in part: "Airships now exist," the report says, "with a range of more than 4,000 miles, and they can travel at a speed of seventy-eight miles an hour. By running their engines slower a maximum range of 8,000 miles can be obtained.

"On first speed Cape Town, South Africa, is today aerially only a little more than three days from Southampton, while this ship could fly across the Atlantic and return without stopping.

"The committee points out that the future airship will soon develop a speed of 100 miles an hour, that it will be fitted with ample saloons, staterooms, with an elevator to a roof garden, and will be able to remain in the air for over a week."

Mr. Edward M. Thierry, the Berlin staff correspondent of the N. E. A., has reported that Germany is building super-Zeppelins for trans-Atlantic flight. His report follows: "I have visited the immense works outside Berlin at Staaken.

"I have been told by Ferdinand Rasch, director of the Zeppelin works at Friedrichshaven a secret hitherto unrevealed—that on a record distance flight in November, 1917, a Zeppelin flew from Jamboli in Bulgaria to Khartoum in Egypt and return, a distance of 1,030 miles in 96 hours.

"On this flight the Zeppelin carried a crew of 22 men and 25 tons of munitions and medicine intended for the relief of General Lettow-Vorbeck, in German East Africa.

"The Zeppelin received a wireless from Berlin when it was above Khartoum, ordering its return because of a rumor that Lettow-Vorbeck had been captured. It turned back without landing.

"This machine had a gas space of 67,000 cubic meters (87,634 cubic yards).

"The new super-Zeppelin, which is now building, has a gas capacity of 100,000 cubic meters.

"It will have nine engines and eight propellers.

Trans-Atlantic Zeppelin Is 800 Feet in Length

"It will be more than 800 feet in length.

"This super-Zeppelin will cost nearly $1,000,000.

"It will have a carrying capacity of 100 passengers and 45 tons of mail and baggage and 30 tons of petrol, oil and water and provisions.

"The first machine for the trans-Atlantic service is to be completed in July. For maintenance of the service planned, eight active machines and four in reserve will be required.

"As soon as the international situation is clarified, it is proposed to establish the service with a hangar in New York."

Roosevelt Arctic Expedition

The Executive Committee of the Aero Club of America have decided to make Captain Bartlett's Arctic Expedition the "Roosevelt Memorial Expedition."

It was Roosevelt, while he was President of the United States, who gave Admiral Peary leave of absence to organize and take charge of the expedition, which led to the discovery of the North Pole. It will be recalled that Peary's ship was named "The Roosevelt" in appreciation of President Roosevelt's interest in the expedition. Captain Bartlett was Captain of the Roosevelt in two Peary expeditions.

Colonel Roosevelt was a veteran supporter of aeronautics. As early as 1897, when he was Assistant Secretary of the Navy, he used his influence to secure the appropriations needed by Professor Langley to continue his work.

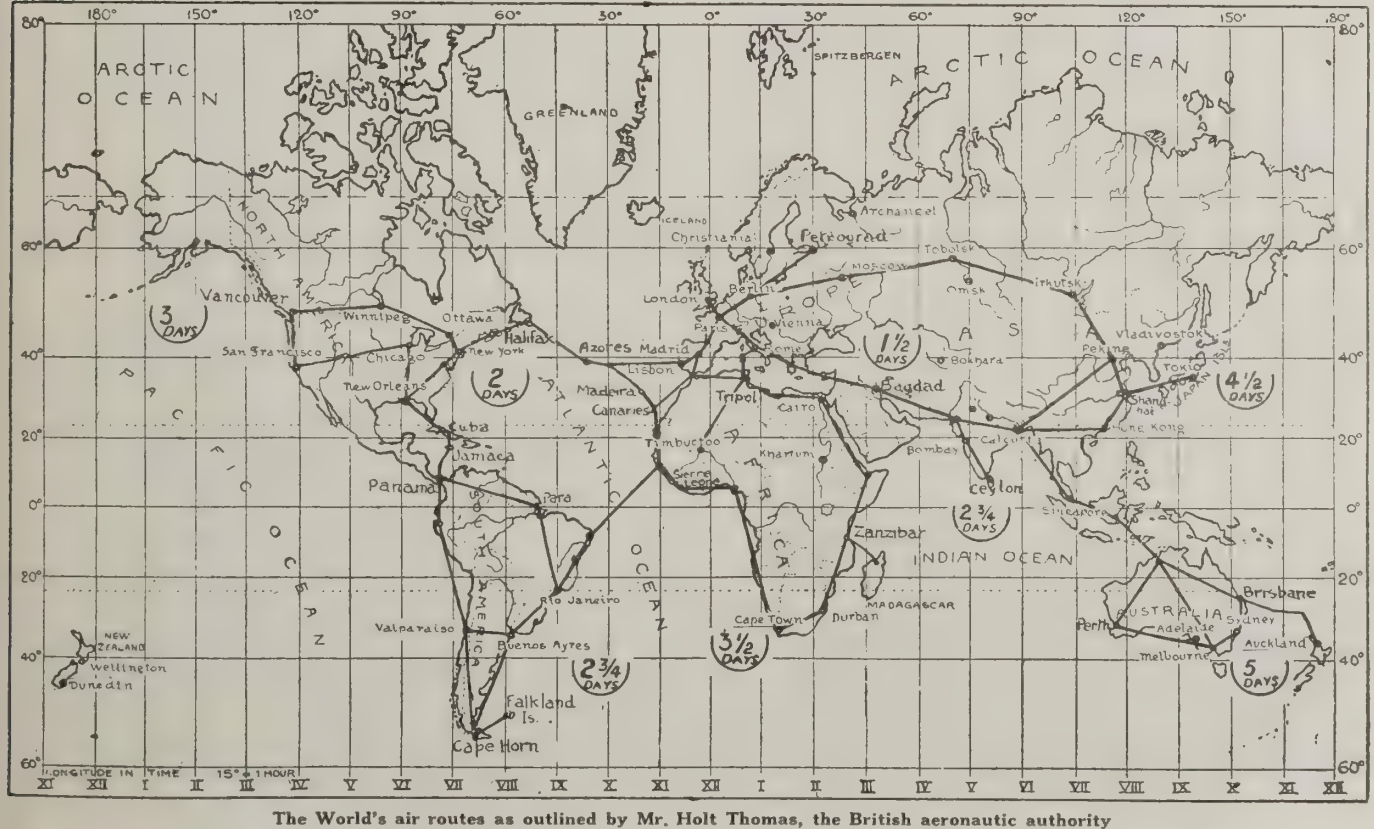
Colonel Roosevelt was also responsible for giving the U. S. Army an aeroplane before any other nation had one. In 1907 he approved the ordering of a Wright biplane and a dirigible.

The Roosevelt Memorial Expedition will have four important missions, as follows:

(1) To explore as much as possible of the 1,000,000 miles of unexplored Polar Arctic regions.

(2) To fly across the top of the world from Cape Columbia on the American side to Cape Chelyuskin on the Siberian side.

(3) To conduct extensive soundings in the Polar Basin and collect flora and fauna from the ocean bottom.



The World's air routes as outlined by Mr. Holt Thomas, the British aeronautic authority

(4) To send up sounding balloons and explore the upper air of the Polar regions, gathering meteorological data.

It is also fitting that the first land, if any land is discovered in this first use of aeroplanes for Arctic exploration, shall be named "Roosevelt Land."

The expedition is to start from the United States next June. There are six weeks of fair weather to July and August when, even in the Polar regions, it is seldom lower than sixty degrees above zero. The plans are to have a ship go to Etah, about 600 miles from the North Pole, in June, when the ice is sufficiently broken to permit the ship to cross Mellville Bay.

The ship would carry a large seaplane or land aeroplane for the final flight across the top of the earth, and for long distance exploration of the unexplored Polar regions, as well as smaller planes for the scouting flights for short distance survey.

Immediately upon arrival at Etah a base will be established, and while waiting for the ice to break up further north to permit the ship to go as far as Cape Columbia, the small seaplanes will fly to Cape Columbia and establish a base there for the large plane which is to be used for the flight across the top of the world, from Cape Columbia on the American side, over the Pole, to Cape Chelyuskin on the Siberian side and for exploration over longer distances.

For the six weeks after the middle of July, when the weather conditions are best for flying in the Polar regions, the large plane as well as the small planes will be put into service, and the important work of the expedition will be done, including sending up sounding balloons in the upper air to gather meteorological data.

Results of inestimable value to the United States and to science will surely be obtained from this expedition. There is no doubt whatever that this expedition can explore, survey and photograph the unexplored parts of the Arctic regions and establish the existence or non-existence of land or lands in that region.

The Committee of the Aero Club of America assisting Captain Bartlett consists of Rear Admiral Robert E. Peary, discoverer of the Porth Pole; Alan R. Hawley, Henry A. Wise Wood, Henry Woodhouse, Rear Admiral Bradley A. Fiske, John Hays Hammond, Jr., Rear Admiral William E. Little, U.S.N.; Professor Charles L. Poor, Colonel E. Lester Jones, U.S.A.; Charles Jerome Edwards, Major Cushman A. Rice, U.S.A.; Augustus Post, Major J. C. McCoy.

British Polar Aerial Expedition

Plans have been quietly laid for a British aeroplane expedition to start for the North Pole in April. The British party will travel via Spitzenbergen, where, under the direction of Captain Wild, who was second in command of Sir Ernest Shackleton's South Polar venture, a landing place is in the course of construction at Lawe Sound, and where a camp with abundant supplies has been established.

Captain Frank Wild is a veteran in Antarctic exploration. He was second in command of the Scott expedition in 1901-4 and was a member of the Dr. Douglas Mawson exploring party some years later. He was with Sir Ernest Shackleton first in 1907-9.

Captain Wild commanded the twenty-two men who were left on Elephant Island April 16, 1916, by Shackleton, when he made his famous journey of 750 miles in an open boat with six comrades to South Georgia Island for relief. Wild and his men lived until August 20 on one meal a day, consisting mainly of penguin fried in blubber, unaware that Shackleton had been successful and that help was on the way. They endured incredible hardships.

Aero Club of America Organized Aerial Transportation Committee

Soon after the signing of the armistice the Aero Club of America organized an Aerial Transportation Committee of important members of the Club to develop plans for the drafting of regulations to govern aerial navigation.

Rear-Admiral Robert E. Peary has been selected as Chairman of this important "Aerial Transportation Committee", of which the following prominent members of the Club have been nominated to be members:

Col. Bion J. Arnold, Roger W. Babson, Sir F. W. Baillie, Major T. F. Baldwin, U. S. A.; Bernard M. Baruch, Capt. R. A. Bartlett, Alexander Graham Bell, Major August Belmont, U. S. A.; Laurence V. Benet, Walter Berry, Lieut. Commander P. N. L. Bellinger, U. S. N.; Lieut. Commander W. Starling Burgess, U. S. N.; James M. Beck, General Theodore A. Bingham, Lieut. Col. James A. Blair, Jr., William H. Bliss, Col. G. C. Brant, U. S. A.; Rear Admiral Mark S. Bristol; Lieut. Col. A. R. Christie, Col. C. C. Culver, U. S. A., Lieut. Godfrey L. Cabot, U. S. N.; Manuel Estrada Cabrera, President of Guatamala; Gianni M. E. Caproni, Col. Charles deF. Chandler, Edward B. Close, Alexander Smith Cochran, T. Jefferson Coolidge, J. Parke Channing, W. Redmond Cross, J. S. Cullinan, Glenn H. Curtiss, Capt. Bronson M. Cutting, Edgar B. Davis, Col. Milton F. Davis, U. S. A.; H. P. Davison, James Deering, Charles Dickenson, Capt. Earl W. Dodge, Lieut. W. E. Doherty, U. S. N.; Eben S. Draper, Irenee duPont, T. Coleman duPont, Brig.-Gen. Robert K. Evans, U. S. A.; Rear-Admiral Bradley A. Fiske, Major Max Fleischmann, Col. A. F. Fuller, U. S. A.; Major Robert Glendenning, Major Howard L. Goodhart, Major C. C. Goodrich, Major David M. Goodrich, Major Edwin Gould, Alan R. Hawley, William Hawley, John Hays Hammond, Jr., J. R. Harbeck, A. A. Harriman, Peter Cooper Hewett, Dr. A. L. Hipwell, W. S. Logan, Lt. Col. F. L. V. Hoppin, Hon. Murray Hulbert, Col. H. B. Hersey, Prof. J. F. Haworth, Col. E. Lester Jones, Major-General W. A. Kenly, Major Fiorello H. La Guardia, Capt. B. B. Lipsner, Henry Lockhart, Jr., Capt. Pierre Lorrilard, Harold F. McCormick, Clarence H. Mackay, Emerson McMillan, Lord Northcliffe, Glenn L. Martin, Col. Archie Miller, U. S. A.; Major J. C. McCoy; W. W. Miller, Harry Bowers Mingle, Wm. H. Page, Augustus Post, George W. Perkins, L. C. Phipps, Col. James Prentice, Major Cushman A. Rice, U. S. A.; Prof. C. L. Poor, R. B. Price, N. G. Rost, Hon. William G. Sharp, Allan A. Ryan, Alberto Santos-Dumont, Herbert L. Saterlee, F. L. Seiberling, J. DeMont Thompson, Rodman Wanamaker, Lt. Col. Wm. Thaw, Brig. Gen. Cornelius Vanderbilt, W. K. Vanderbilt, G. Douglas Wardrop, managing editor of AERIAL AGE; Felix M. Warburg, Sidney B. Veit, Henry Woodhouse, Major Orville Wright, Harry Payne Whitney, John N. Willys, K. M. Turner.

"One of the purposes of the Aerial Transportation Committee," said Mr. Hawley, "will be to advise the representatives of scores of cities in the United States who are constantly applying to the Aero Club of America and the Aerial League of America for information, advice and guidance in establishing aerodromes.

"Another purpose will be to cooperate with the Post Office in establishing aerial mail lines and extending the aerial mail service.

"Preliminary reports on the subject of aerial transportation and regulations to govern aerial navigation have been made to the Board of Governors of the club and data has been collected showing what England, France and Italy are planning to do. These countries are planning most extensive air lines, although their geographic conditions are not as favorable for aerial transportation as they are in the United States. We should do likewise in this country and utilize the 20,000 Liberty motors which are being stored away and the tens of millions of dollars' worth of aeroplanes which will be entirely wasted unless used during the coming six months, as aeronautic equipment deteriorates fast."

Recommendation for the Solution of National Aeronautic Problems

In an address before the Convention of the National Rivers and Harbors Congress, President Hawley of the Aero Club of America, offered the following recommendations:

(1) The organization of a Government organization simliar to the Grain Corporation, to be known as the Aerial Transportation Corporation, or a similar name, capitalized at $50,000,000, which shall take over the $800,000,000 worth of aeroplanes, motors and aeronautic equipment which the Army and Navy cannot use and are trying to dispose of. This corporation shall devise ways and means for salvaging this equipment, utilizing whatever can be used to establish aerial transportation lines in the United States and supplying the South and Central American countries which are anxious to have aerial transportation lines.

(2) Let this Government owned Aerial Transport Company take over the twenty or so Army aviation stations and aviation depots which the Army has abandoned or is abandoning and operate them as public aerodromes where the Post Office as well as civilian aviators can use the hangars and facilities by paying rent.

(3) Let this corporation establish and operate aerial transport lines between industrial centers. Some of these lines can run from New York to San Francisco, from Washington to Chicago, from Minneapolis to New Orleans, from New Orleans to New York, from Seattle and Portland, Oregon, to San Francisco, Los Angeles and San Domingo, from Detroit to St. Paul, from Key West to Havana, from Portland, Maine, to Boston and New York. Scores of such aerial



The aerial limousine of the Dayton-Wright Company, making a week-end journey of 1,500 miles an event of luxury

transportation lines could be established and operated immediately, employing some of the thousands of idle Army and Navy aviators and mechanics, and they would solve the difficult national problems of transportation, solving the problem of utilizing the idle equipment and employing the idle aviators.

(4) All air traffic should be classed with interstate and international traffic, and the interstate traffic regulations should be extended to include air traffic.

(5) The Department of Commerce should be given charge of the registration and inspection of aircraft, creating in the Department of Commerce an Aircraft Inspection service similar to the present Steamboat Inspection Service.

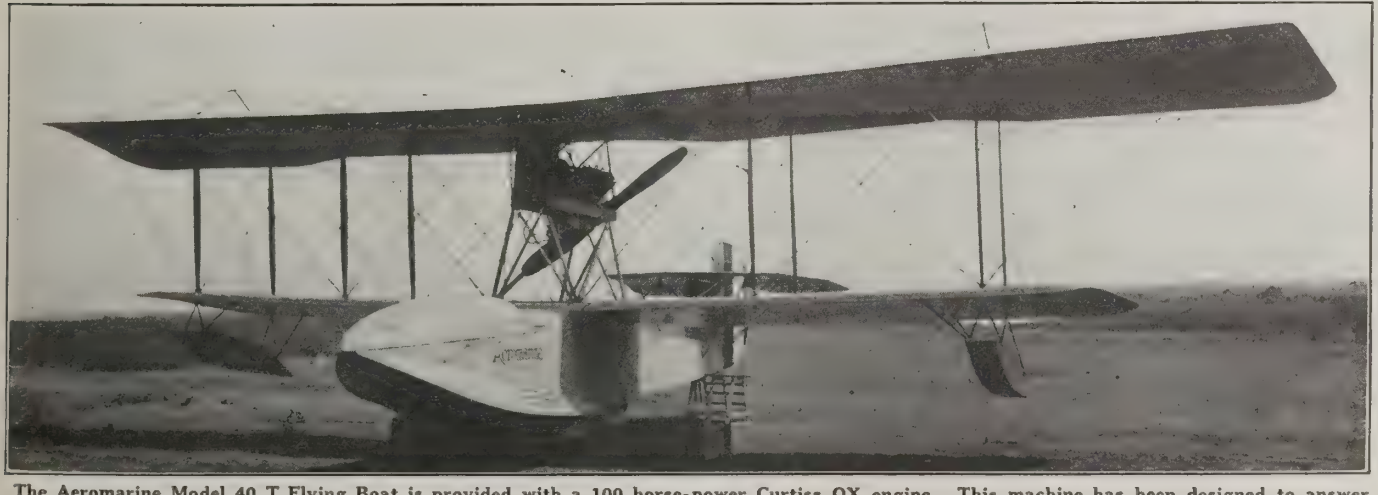
"The subject is most extensive and it is therefore impossible to discuss in detail the regulations that have been proposed by the British Aerial Transport Commiittee. Mr. Henry Woodhouse has made a close study of the aerial regulations of different countries in the past ten years, and has pointed out by actual illustrations how some of the most difficult problems of enforcing the aerial regulations can be solved by using the wireless telephones developed by Colonel C. C. Culver."

Foodstuffs by Aeroplanes

The British Air Ministry have sanctioned the scheme to carry foodstuffs to Belgium by aeroplane. This is satisfactory news and marks the inception of the commercial traffic from this country, although those who are endeavoring to read the signs in the skies have noted with interest that a stipulation has been made by the authorities. In giving their approval to the scheme the Ministry have insisted, as in the case of the Paris Airbus, that service-pilots of the Royal Air Force, and not private aviators, shall make all the aerial journeys. This rather tends to strengthen the belief that the Air Ministry means, if possible, to retain the control of commercial aviation, although it may be that on the signing of Peace the ban will be lifted. We must wait and see. So far as the scheme is concerned, the Belgian authorities have been led to adopt it, as they find it impossible to ship the foodstuffs they have purchased in England for their people, owing to the congestion at all the docks in England. The flights are to take place from Hawking's Aerodrome to the Belgium Aerodrome outside Ghent, and the load carried will comprise about two tons of foodstuffs.

Popular Priced Trips in England

General Sir David Henderson, of the Royal Air Force, proposes before demobilization to organize flights of six or eight aerplanes around the principal cities and towns in Great Britain. The object of these visits would be to provide flights for the general public at a low fee, approximately three dollars, and to provide cross-country flights, exhibitions, and general instruction on aviation.



The Aeromarine Model 40 T Flying Boat is provided with a 100 horse-power Curtiss OX engine. This machine has been designed to answer requirements of the sportsman.



The Curtiss twin-motored Flying Boat, which will become popular with sportsmen with homes on the waterfront, accommodating, as it does, a dozen passengers

Flying-Boat Popularity

No small share of the coming developments lies with the flying-boat, which has been improved considerably since it was introduced to active service on behalf of the Allies. The sloppy machines of those days and the comfortable enclosed type which is now in view at the Aeronautic Exposition for civilian use present a great contrast, with all the advantage of experience and serviceability on the side of the later production. Some of the designs which have come under our notice recently combine boat excellence with biplane merits, every detail proving that the lessons enforced in the stern tests of warfare have been properly applied in planning the new craft. It would be idle to say that the flying-boat has fully qualified itself yet for the open sea, where rough water and rough weather have to be taken into account, but it is a progressible proposition and will go ahead in more senses than one.

Commercial Aeronautic Possibilities in South Africa

A London aeronautic publication has discussed the future of commercial aeronautics in South Africa in a recent issue which indicates the progressive attitude of the British industry.

Realizing that for the present the most important function that aeronautic transport can accomplish is the delivery of mails and passengers, in this respect, conditions in South Africa are especially conducive to aerial commerce. The population is small, but wealthy and active. Distance between cities is large and railroad communication poor. The railways follow the contour of the hills, having been built at so much per mile. The contractors therefore avoided bridges, tunnels and embankments. Grades of one in forty are numerous. The windings and contortions of the snake-like tracks make it seem quite possible in many places to shake hands with the engineer in the rear car. The ever-present sand and dust are especially disagreeable. These conditions, as compared with cool and speedy transportation by aeroplane, would make it difficult for railroads to compete with well-organized aerial passenger lines.

The stable weather conditions, absence of hurricanes and high winds, extreme clearness of the atmosphere, the definite rainy season on only one short fixed period of the year make conditions excellent for reliable air travel.

The natural wealth of the Union, not only in precious metals and minerals but in the whole range of natural resources, as well as its ability to supply many of the necessary materials for the maintenance of commercial aircraft, makes the prospects of an enterprising aircraft organization most excellent. Alcohol suitable for fuel is produced in considerable quantities and the climate in some parts is suitable for spruce growing. Land is available for aerodromes at low rates.

The details of various routes are outlined in the article. The first route is suggested from Cape Town to Kimberly, 525 miles air line. The train service between these important points consists of two trains each way daily, with a running time of thirty hours. The estimated time by air, allowing for stops, is eight hours.

A route from Kimberly to Johannesburg, requiring 45 hours by rail, could be covered by aeroplane in twelve hours. From Kimberly to Durban a saving of thirty-six hours could be made, the time by rail being forty-one hours and by plane five and a half hours.



The Dayton-Wright De Haviland 4, converted from a bombing machine into an enclosed passenger craft for two passengers and pilot

The ultimate expansion of an aerial transport system would result in a route from Cape Town to Cairo.

Australia Has Commercial Aeronautic Plans

Auckland, New Zealand.—The Minister of Posts and Telegraphs in New Zealand is supporting a movement for the establishment of aerial transport and aerial mail lines between various parts of New Zealand, extending from Auckand to Dunedin, a distance of 700 miles, and between New Zealand and Australia.

Mr. L. A. Walsh, the managing director of Walsh Brothers & Dexter, Ltd., aeronautical constructors and engineers, who was in charge of the training of military aviators during the war, has been one of the moving spirits in the development of these plans. Under his direction several types of single and twin-motored flying boats have been constructed, employing Hall-Scott motors for propulsion.

A large number of military fliers will be available for operating commercial aircraft.

A 3,000 H.P. British Machine

The latest British commercial aeroplane is the Tarrant triplane, a huge machine with a wing span of 150 feet and a length of 75 feet, being built by Mr. G. W. Tarrant, of Byfleet, Surrey. It will, when completed, have a six-engine power plant developing 3,000 H.P., and it is expected to travel at 80 to 100 miles an hour for 500 miles without refuelling. The machine, which is a development of a "bomber" about to be produced when the armistice was signed, is designed to accommodate passengers or cargo.

People seated in the body of the machine will be in an enclosed cabin provided with wlndows. As a cargo plane the machine will carry nearly six tons of goods. The whole of the interior of the body space will be available for the cargo or for passengers. By the sacrifice of cargo space and the substitution of petrol tanks, the range of the triplane could be greatly increased, a trip across the Atlantic being made a comparatively simple task.

Marconi Company to Supply Wireless Passenger and Mail Aeroplanes

Godfrey Isaacs announced December 18 that the Marconi Company would outfit aeroplanes employed in air passenger and mail service with wireless and would supply operators in the same way as it now serves ships. It also is intended to receive regular reports of air conditions in different localities and to circulate these for the information of the pilots. As every aeroplane will have either a name or distinguishing number, it will be possible to send telegrams from any part of the world or from any ship to an aeroplane. It is intended that this organization will be ready by the time the peace treaty is signed.

Arrangements recently have been made for the erection of wireless stations in the extreme parts of China, one on the frontier of Cashmere and another on the Chinese side of Siberia. Mr. Isaacs has arranged with Handley Page for the transport of the necessary machinery by one or more of his big machines. The journey inland will take two or three days in place of the same number of months.

A Free Hand for the Manufacturer

Now that we know how we stand about commercial aviation there is one matter upon which we must have a clear understanding. In common with others we are anxious to make certain that when the Government gets a firmer hold on aviation the tendency will not be to create or encourage monopolies and to freeze out the smaller firms. In this country we have no liking for the trust or anything resembling it. It is a bad old principle to allow any giant enterprise to get the control of anything, for the reason that not only does it lead to graft and other evils but it kills individuality. The latter quality has placed us where we are, not only in aviation but in all branches of the national work. At the beginning of the war, while some of the larger munition works were struggling to reorganize their methods, it was the small shop which came to the rescue and enabled us to meet the great demands made upon us. Similarly, some of the lesser aviation manufacturers, working at first without a great deal of assistance—and, if the truth be told, without any too much encouragement— have made good and contributed in no small measure to the supremacy we have won. We must continue to give these firms free facilities to develop the schemes which they have been formulating and which would havv been put into operation but for the fact that during the war they have been tied down to a particular line or policy. We want competition. Without it we shall be in danger of getting into a rut. The big firms have done well and, we doubt not, will do still better work in the future. But there are, doubtless, firms which, so far, we have heard little about, who may have inventions or plans which will place us head and shoulders above our rivals. Are they to have a free hand? There can be only one answer to the question.



The Curtiss triplane which will undoubtedly be heard from in the speed competitions which will be a feature of the Aeronautical Conveniton at Atlantic City in May

THE AERONAUTICAL EXPOSITION

LARGE crowds of interested spectators have daily visited the Aeronautical Exposition being held in Madison Square Garden and the 69th Regiment Armory, under the auspices of the Manufacturers Aircraft Association, the exhibits of which were completely described in last week's AERIAL AGE.

Various speakers of national prominence have visited the Exposition each day, and have delivered rousing messages on the role of aeronautics in war and commerce. We quote some of the more outstanding speeches.

Admiral Usher

Admiral N. R. Usher, Commander of the Third Naval District, told a large audience that America had advanced so far in aeronautics since its entrance into the war that it was only a question of a short time before the aeroplane will rival the railroad and automobile as a means of transportation in this country.

Vice-Admiral Albert Gleaves, formerly commandant of the New York Navy Yard, after viewing the exhibit, said:

"The part which has been played by the aerial arm of the United States Navy justifies me in saying that the possibilities open to this new means of transportation are almost unlimited. So much has been accomplished with the military machines that, as I look at these newer commercial types, I cannot visualize the future. It's a wonderful prospect for aviation."

Admiral N. R. Usher said:

"I come here this afternoon on the part of the Secretary of the Navy and at the request of the officers of the Aeronautical Exposition to say a word of the part the Navy played in the development of the navigation of the air. The exposition is staged and offered to the citizens of our country that they may become better acquainted with that new art which at this time is still in a state of progressiveness.

"Previous to the outbreak of this war, already our Navy had taken an interest in navigation and use of the air for the purpose of belligerent action aloft. By reason of various circumstances in our country, although the first fliers were our own—the Wright Brothers showed the way to others—the announcement of the war found us without that preliminary preparation to enable us to at once make the supremacy, but I am pleased to say that, due to American ingenuity and the devotion of our manufacturers—many of whom are represented here—at the termination of hostilities we were in a position to take complete charge aloft. Our men were able to dominate the air.

"In this immediate surrounding you will behold the exhibit sent here by the Secretary of the Navy, showing you the present as well as the former efforts made to provide efficient and sufficient fighting machines. The results of the American Liberty engine you all know, and I may say that at the time the armistice was signed. the American Navy had 17,000 men—fliers and non-fliers—abroad ready to take the Navy's part in the conflict. For the last eight months of the war we had been able to put abroad a sufficient number of planes to properly patrol the shores of the North Sea, the French coast and the Adriatic coast in the Mediterranean.

"From among other preparations which had to be made by us for actual entry into the war, we were ready at the time the Hun quit. But with that progress which you see in this Exposition, not only in the Armory, but in the Garden, you will see that our country is prepared to navigate the air with machines worthy of the confidence of all, and, without being a prophet, one may say that we are at the entrance of aerial navigation for carrying people, from one part of the country to another, which will presently be a strong competitor with the railway or automobile. I bespeak your careful attention and interested appreciation of what the Association has done to present this to your view. I speak not only for myself, but I have come here at the request of the Secretary of the Navy. I invite your attention to what has been done by our own flying people."

T. Kennard Thomson

Mr. T. Kennard Thomson, consulting engineer, said that how soon America will take to air flying of all kinds is up to Congress.

Quoting Assistant Secretary of War Crowell and Assistant Secretary of the Navy Franklin D. Roosevelt among big men in the service who declare New York City laggard in appreciating the present necessity for landing and getting off facilities for aircraft, Mr. Thomson outlined a project which he said he had presented to Congress and the President for extending the lower tip of Manhattan, off the battery, four miles into the bay, for use as a flying field.

Mr. Thomson mentioned more than a score of Army and Navy notables who had flown to New York's nearest landing place, Hazelhurst Field, Mineola, from Washington, D. C., during the past week, to discover that more time was required for the land transit into Manhattan from the Long Island hangar than was consumed in flying from the starting base.

In his chat, the speaker sketched the growth of the city from an Indian village to the present time. How many of the streets of the city got their names, the excitement that a viaduct across Broadway in 1829 created when it was built to prevent vehicle accidents, the alarm of the populace when the draft riots of the Civil War broke out, and other flashes of the Island's early history were included in the review.

Mr. Thomson's Battery hangar anticipates a coffer dam walling in the extension, providing work in its building for more than 50,000 men a year, and the hangar's completion within five years.

General Guy Livingston

Gen. Guy Livingston, director of the British Air Service before the formation of the Air Ministry, said:

"The most important thing to emphasize at this stage of aerial development is the necessity for cooperation between the great nations. Let us place all our cards on the table, so that we can benefit fully from all information that will help in the evolution of flying. America and Great Britain, more particularly, should get together.

"Personally, I don't think it matters a bit who first crosses the Atlantic—America, France, Italy or Great Britain.

"Very probably the Atlantic will be crossed this year; in fact, I think it will be accomplished within the next two or three months. It is precisely the same problem that confronted aviators some years ago in the crossing of the English Channel.

"Latham came within a few yards of the English coast before his engine failed him. Then a little later Bleriot, by a little luck, succeeded in making the crossing. After all, there is a good deal of luck in the matter of long distance flights, and the man who meets with favorable weather conditions will be the first man over.

"Great Britain has already established an Air Ministry that will cooperate with the manufacturers and coordinate all branches of aircraft development. At the present moment in this country you have the Army, Navy, the Marine Corps, and the Postal Service and the Interior Department all engaged in aviation development. In the natural evolution of things, I feel quite sure that within the next five years there will be an Air Department in America to do the same thing. It is only natural that the great business sense of Americans will quickly realize the necessity for that.

"The aviation industry will be retarded if irresponsible companies are formed, which make great and impossible promises and then sell stock to the public, giving a very small or no return.

"The story is so good that it seems a pity to overstate it and thereby lose the confidence of the public. I am quite convinced that if some-



The Gallaudet Aircraft Corporation's Exhibit—the small monoplane in contrast with the Model S Seaplane



A view of the accessory section, showing Standard Parts Co., Ajax Auto & Aero Sheet Metal Co. and Dayton Wire Wheel Co.

one told the public right now that it was possible to fly an aeroplane at five hundred miles an hour, the story would be generally believed. We may fly at five hundred miles an hour, but it will not be for many years.

"I think you will have a sound aircraft industry here in five years if the manufacturers do not tell the public they are going to fly to the moon in a few minutes.

"The main thing is not to promise anything that cannot be possibly accomplished. Don't let us tell the public that aeroplanes are going to supersede the Twentieth Century Limited, or the train from London to Manchester. The aeroplane is not going to supersede any form of transportation, but will be an adjunct to all of them."

Senator Key Pittman

Expressing astonishment that, after flying from Washington in a Glenn L. Martin bombing plane, the party could find no place in New York City to land, but was compelled to go down to Mineola, Senator Key Pittman of Nevada urged New York citizens to demand of their representatives in Congress legislation that would provide proper landing fields for commercial aeroplanes in every large city in the country.

The time is here, the Senator said, when the aeroplane as a commercial proposition is no longer a doubt but a certainty. Just how soon it reaches its full development in the commercial field, he added, would be up to the people.

Senator Pittman travelled from Washintgon to Mineola with Benedict Crowell, First Assistant Secretary of War, against a head wind in two and one-half hours. The pilot was Major Maurice Connolly, ex-representative from Iowa, who was accompanied by Captain Roy N. Francis, of the Army Aviation Service.

In introducing Senator Pittman, Assistant Secretary Crowell said every one agreed that the future of flying depended on the existence of the private manufacturer. He urged that the organizations which had been developed during the war by private aircraft manufacturers be perpetuated.

Senator Pittman caught the attention of the crowd at the outset by saying that after fifteen minutes in the air he felt just as safe as though on land.

"I want to say to you," the Senator continued, "that today for the first time in my life I rode from Washington to your city in front of a Glenn L. Martin bomber. There was no jar. There was no danger. It rode easier than any vehicle I ever entered in my life. In fifteen minutes I felt, as I know now, that it has come to stay. It has come to be a great public utility. It has come to give this country, with its genius and ingenuity, control and domination throughout the world to which it is entitled. It rests with the people of this country whether or not they are going to make it so.

"When you understand that the navigation of the air is as easy as the navigation of the water, when you understand that the aeroplane is just as practicable as the automobile, then you are going to support it.

"But first you are going to insist that there shall be established in your great city and other great cities places where these planes can land, instead of going to Long Island. Every city in the United States must have a place where these ships can land, prepare and repair, and it is 'up to you to go to your representatives in Congress and insist upon adequate laws to bring this about."

After viewing the exhibits, Senator Pittman reiterated that support should be given aerial navigation and that he would do his part toward passing any law that would aid the development of the aeroplane for commercial purposes.

Mr. Otto Praeger

A radio direction finder, which literally "calls to its home port" the mail carrying aeroplane, was described for the first time by Otto Praeger, Second Assistant Postmaster General, in a speech at the Aeronautical Exposition.

It was Aerial Mail Day, and Mr. Praeger, along with other aero mail officials, was the guest of honor.

"A radio direction finder," said Mr. Praeger, "has been worked out so accurately for the Post Office Department that the aero mail testing plane has flown from Washington to Philadelphia by signals from the League Island Navy Yard with the pilot not a hair's breadth out of its course. The finishing touch to this radio direction giving is being put on the aeroplane mail planes by the Bureau of Standards in a device that will give the pilot the exact center of the air mail field and enable him to descend in the thickest fog in an intensely illuminated streak on the ground which he will be able to see sufficiently far to permit setting down his plane in any kind of weather."

This announcement was of particular significance because of Mr. Praeger's definite statement made earlier in the day that the New York-Chicago Aerial Mail Service would be in operation before the summer is over and that probably the service could be extended to St. Louis, Omaha, Minneapolis and St. Paul.

Mr. Praeger's plans call for the use of 18 special ships, which have been promised by the manufacturers by April 15. His schedule calls for night service of from eight to ten hours between New York and Chicago. Service between Cleveland and Chicago will begin first, Mr. Praeger indicated.

"We stand now at the threshhold of commercial aviation," Mr. Praeger said in his speech. "Only a short step needs to be taken to bridge the gap between military flying and commercial aviation. It is only a matter of readjusting to the needs of commerce the wonderful development achieved in military planes. It is this readjustment that the Aerial Mail is working out.

"What is required for a commercial aeroplane is dependability in operation, safety in operation, and economy in operation. To accomplish the first you must have a plane that will stay in the air. You already have the power that will drive an aeroplane at better than railway speed against the severest gales that it may encounter, and you are rapidly perfecting the instruments that will enable navigation of an aeroplane with the certainty of a ship at sea.

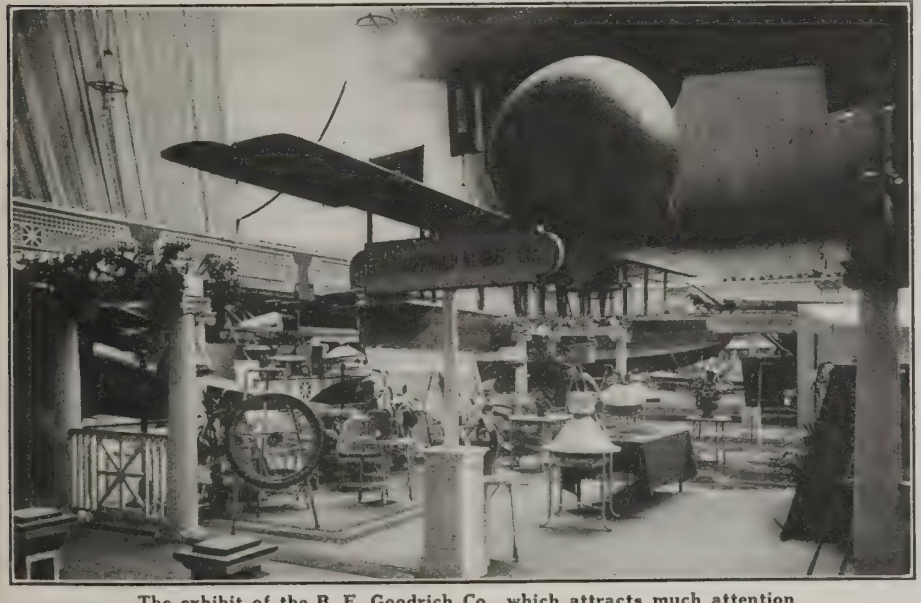
"A vessel in distress can ride on the waves in security until repairs are made. A railway train can stand on its tracks or limp into a siding for repairs, and a motor truck can halt on the pike pending the making of adjustments—but an aeroplane must come down to whatever berth it can find when its mechanism goes out of gear. A single motor plane will remain in the air only so long as its engine can turn up a certain number of revolutions a minute. A triple motor plane can lose one power plant entirely and reach its destination against a head wind, and a four or five motor plane can lose at least two of its engines and not only stay in the air, but proceed on its way while minor adjustments are being made in flight. How great is this prospect of certainty of operation in a multiple motor plane may be readily judged from the remarkable performance of the single motor planes that carry the mail daily between New York and Washington.

"Between May 15, 1918, and March 1, 1919, the Aerial Mail operations between New York and Washington covered 112,228 miles, or 1,536 hours in the air. In all this flying there were only 29 forced landings on account of mechanical trouble; that is, one forced landing to every 3,870 miles of flying. Seven of the forced landings were due to leaks in the oil system; 6 were due to leaks in the radiator and water lines; 6 were due to plugs fouling; 3 were due to magneto troubles; 2 were the results of valve failures and one forced landing each was chargeable to the generator, the distributor, the gas line, the carburetor and the breaking of the connecting rod. It may be interesting to note that on March 1 we have not had a forced landing due to spark plug fouling since December 24; we have had no forced landings due to carburetor trouble since August 27; we have had no forced landing due to gas line leak since July 23, 1918; no forced landing due to dirty distributor since June 3; no forced landing due to magneto trouble since December 11, 1918.

"Right here it might not be amiss to say a word as to the safety of pilots in flying the aerial mail. In the 112,228 miles flown between New York and Washington we have never had a plane to fall out of the sky. We have never killed or crippled a pilot on this mail route. There have been six cases of bruising in forced landings that, however, did not incapacitate any pilot for as much as one hour, and there has been but one serious injury to pilots on the New York-Washington route. One mechanic lost his life by coming in contact with a whirling



The SVA biplane constructed by Gio Ansaldo & Co.



The exhibit of the B. F. Goodrich Co., which attracts much attention



The Packard Biplane, with special 8 cylinder Packard aviation engine

propeller on the ground, and one applicant for a position as pilot lost his life in flying a De Haviland plane to demonstrate his ability. This is a record in daily cross-country flying, in all kinds of weather, with a parallel, and shows that commercial flying is not in the same dangerous class with stunt or military flying.

"There is one more problem—a most essential problem to successful commercial navigation. Aeroplane manufacturers must solve this. It is the problem of landing your plane on a small plot of ground. There is no use in arguing against this proposition. Aeronautical engineers must solve that problem to make the aeroplane a complete success. Until that problem is solved, forced landings or landings even on prepared fields will not be robbed of their terrior, of their danger to life, and their danger to property. The man who will show us how to flutter the aeroplane down as a bird lights will have done almost as much for aviation as Langley and Wright, who have shown us how to fly. When you solve that problem, everybody will fly and aeroplane factories will have to operate their shifts a day to supply the demand. If you do not solve this, the manufacturers will have trouble finding market enough to keep one shift going economically."



The Boeing Seaplane, described in detail elsewhere in this issue



The Goodyear Tire & Rubber Co. Exhibit

The Goodyear Exhibit

One of the most elaborate and interesting exhibits at the Aeronautical Exposition is that of the Goodyear Tire and Rubber Company of Akron, O. This exhibit contains a complete line of rubber aeronautical accessories, samples of balloon fabric and models of the different types of balloons. Suspended in the booth are three miniature balloons, a representative of each type, that has seen wide use in the war. These three types are the spherical or free balloon, the kite or captive balloon, and the non-rigid dirigible or blimp type of balloon. These balloons are built to scale and in every respect, except size, like the types of balloons that have been used by the Government in its air programme.

The exhibit also contains a model car for a big dirigible, the kind that Americans will soon be riding in during their transatlantic trips.

A very interesting feature of the exhibit is a balloon suspension patch, which shows the method of attaching to the balloon the ropes that hold the passenger carrying basket. A big balloon patch, shaped somewhat like a mammoth finger, is shown lifting a weight of 1,000 pounds, and as the entire balloon is usually required to sustain a load of little more than a ton, with upward of forty such balloon patches to help, the immense factor of safety in the suspension of the car is readily appreciated.

The big feature of the exhibit is a massive kite balloon of the type that was used on the battle fronts. This big bag is suspended from the roof and extends nearly across the width of the exposition hall. It is 90 feet long and 22 feet in diameter.

The Goodyear Tire & Rubber Co. began the manufacture of balloons and aeronautical supplies before the war, so that when our country entered the war, and an immediate need came up for balloons, this company was in position to commence prompt manufacture of the lighter-than-air craft equipment that the Government needed.

A big balloon pilot training school was established in which Goodyear men were trained as pilots and these pilots, in turn assisted in the training of the naval student officers, sent by the navy to receive instruction in the Goodyear school.

Since the cessation of hostilities the Government has taken over the Goodyear flying field and is now operating it as an experimental balloon station.

During the war this country made and delivered to the Government 900 balloons of the different types shown at their booth at the exhibition.

The Navy Dirigible

The most imposing exhibition at the Aeronautical Show is the big Navy coast patrol dirigible, which extends practically the entire length of the 69th Regiment Armory. This big balloon, the A-247, was built by the B. F. Goodrich Company in August, 1917, and is said to be the first dirigible accepted and used by the Government. It is 167 feet long, 33 feet in diameter and is driven by a 100-horsepower Curtiss engine. It has been in actual service over seventeen months, patrolling the coast, looking for submarines, &c., and has covered over 23,000 miles. It has never had an accident.

The activities of the B. F. Goodrich Company in aeronautics makes an interesting story. When the war broke out the Government wanted quick

action, and the Goodrich Company was one of the first to jump in. The big dirigible shown was the first one built, and it was accepted. When hostilities stopped the company was building one balloon a day, and had built up an enormous department of aeronautics, capable of great production and expansion.

Training Courses in Colleges

Anticipating the commercial development of aviation and at the same time assuring a ready air force for military exigencies which might arise in the future, the Division of Military Aeronautics is about to inaugurate a training course for college students. The course which has been designed, not to interfere with the prescribed studies, is expected to turn out in three years a finished aviator.

The plan, as outlined by Colonel B. F. Castle, a member of the Control Board of the Division of Military Aeronautics, provides for the absorbing by the college student while working for his degree of subjects included in the curricula of wartime ground school. This takes care of the necessary theoretical work in three months. The flying training under the Government's plan will be given during the Summer months at the various flying fields owned by the Government. The student aviator in order to win his coveted "wings" will be obliged to take this flying instruction three months annually for three years.

The Government plan, as explained by Colonel Castle in a statement, is as follows:

"As regards military aeronautics units of the Reserve Officers' Training Corps, we are proceeding on the assumption that aviators will become superannuated more rapidly than any other kind of officer, so that it is imperative that the supply of trained personnel be kept up. In view of the strength of the air service at the cessation of hostilities and in view of the depreciation among our reserve officers of not less than 10 per cent. a year, it is estimated that we must draw from some source about 1,000 pilots, 850 airplane and balloon observers, and 100 engineer officers every years. West Point, essentially military schools, and the ranks can be drawn upon only to fill up the regular establishment. The reserve then must be filled, as it was during the war, largely from the colleges and universities.

"In order not to take the better part of a year or a man's time to train him as a pilot or observer the machinery of the Reserve Officers' Training Corps, as established by General Order No. 49, 1916, (W. D.,) and now in process of modification, was chosen as most likely to bring about desired results.

"In outline the plan is to give the equivalent of the work formerly done in the ground schools, exclusive of military practice, that is, airplanes, engines, gunnery, navigation and maps, infantry and artillery co-operation, and signalling, at the colleges and universities duirng the college year and give flying and military training during the six weeks' Summer camps held at Northern flying fields. It is estimated that three Summer camps will be required to qualify a man for his wings.

Three Years of Study

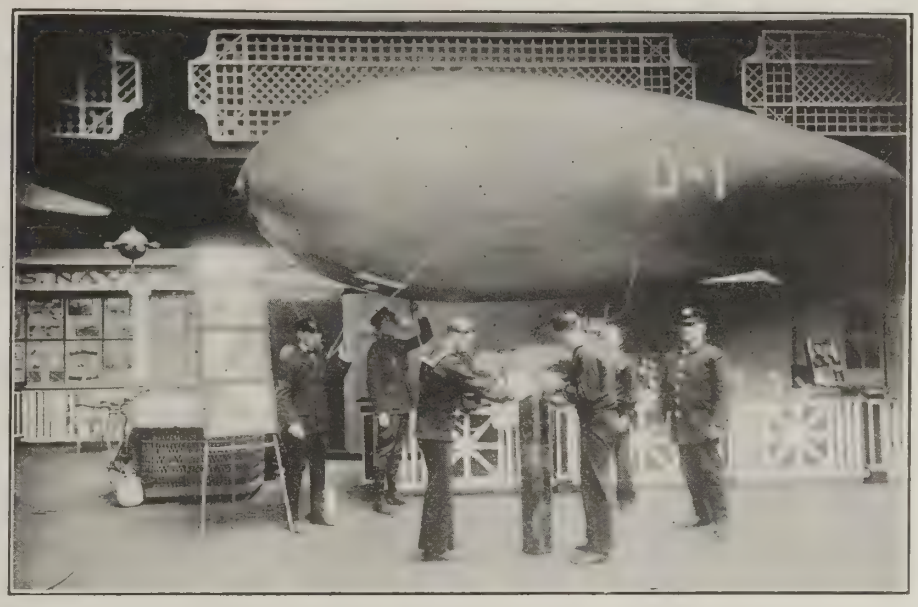
"The pilot at the first Summer camp is introduced to the army and to the air; the second turns him out a good straight flier; the third teaches him gunnery, bombing, and other specialties.

"The airplane observer at the first Summer camp will get much the same training as the pilot, but, at the second camp (spent at the Artillery School of Fire) he will learn the whole duty of an artillery observer, and at the third camp, serial gunnery, bombing, reconnoissance, and contact. The curriculum for balloon observers is not yet worked out in detail.

"The training for squadron engineer officers will involve courses at college in the scientific and engineering aspects of airplanes, airplane engines and accessories. The Summer camps will give the student practical insight into the problems of plans and engine repair and maintenance, and ship and hangar administration. The third Summer will be spent at an aviation experimental station learning the interior secrets of engine and plane design and testing.

"Apart from the college work, junior units will be established in mechanical training high schools, with the aim of training boys of a mechanical turn in the technical side of aviation, preparing them to be Air Service noncommissioned officers in time of war. One of the greatest difficulties of the situation just passed was the recruiting of the necessary trade specialists for our service, repair and construction squadrons. The Air Service needs trained chauffeurs, bricklayers, plumbers, carpenters, electricians, machinists, indeed, men of every craft in great numbers, and in another emergency must know exactly where to find them.

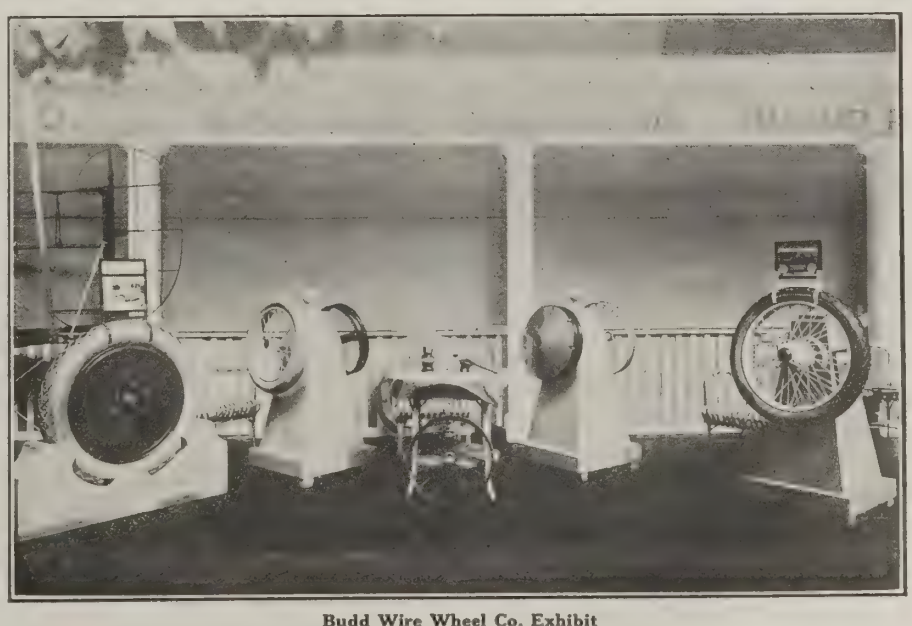
"Still another class of training is contemplated in the plan to co-operate with technical schools and engineering colleges in the training of aeronautical engineers who will be men highly trained as engineers and specialized particularly in the most far-reaching problems of aviation.'



Navy assistants demonstrating the use of Helium

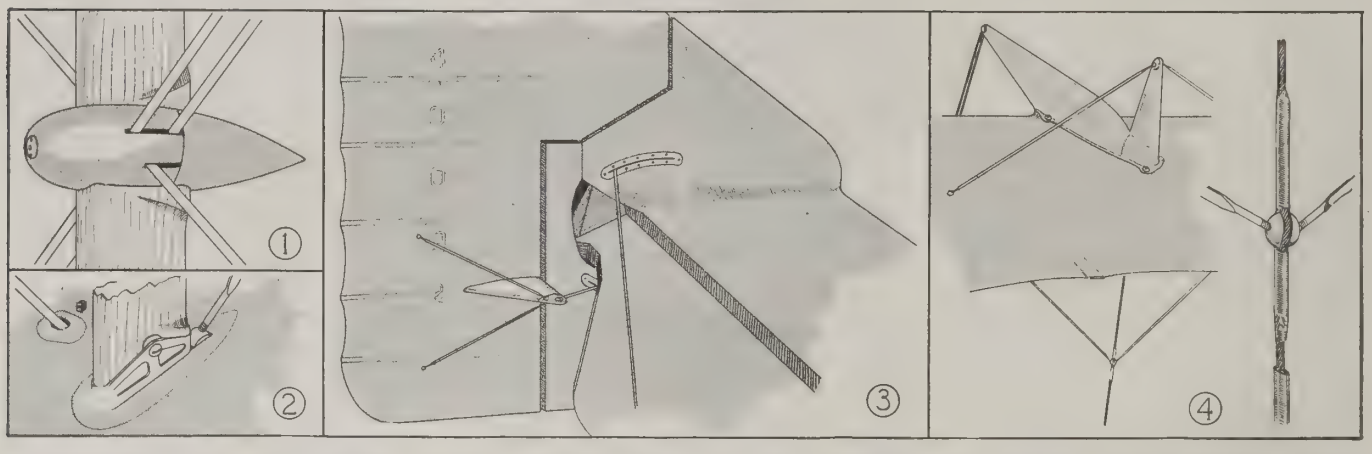


The Thomas Two-Seater Scout



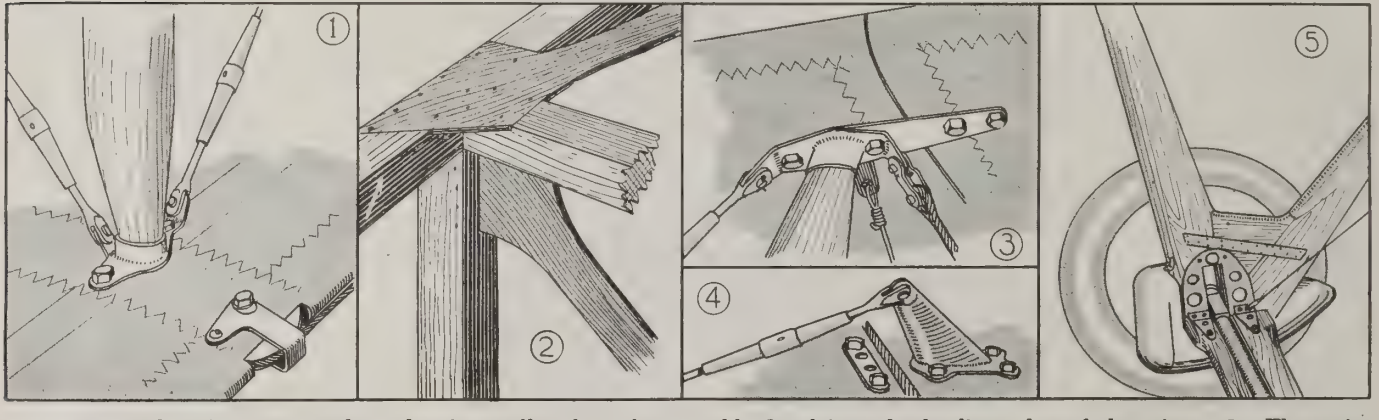
Budd Wire Wheel Co. Exhibit

THE THOMAS-MORSE TYPE M-B-3, 300 H.P. HISPANO ENGINE FIGHTER



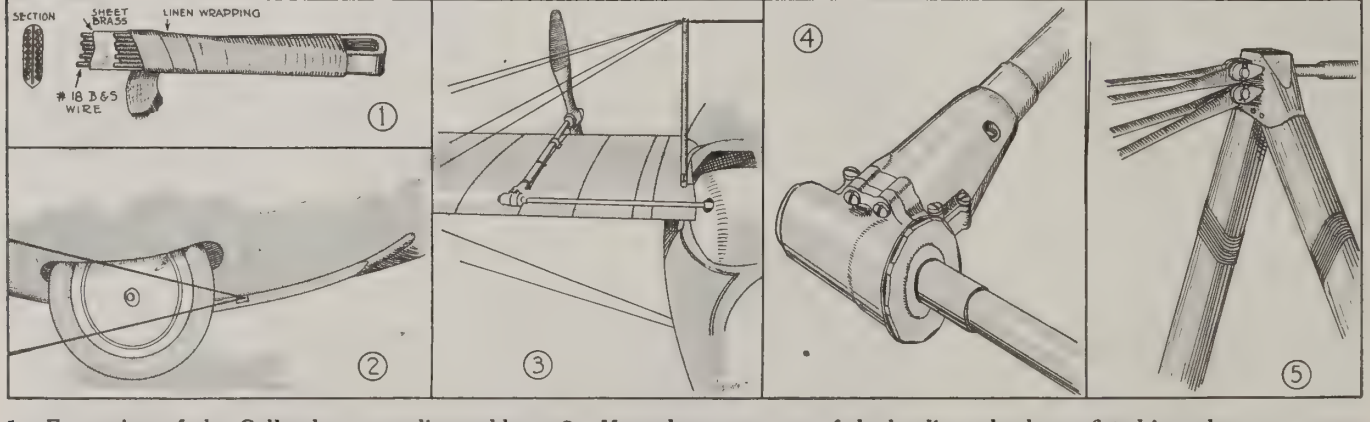
1—Streamline cap at wire crossing, middle interplane strut. 2—Left lower front strut socket. 3—Empennage, showing the unusual arrangement of the elevator lever which is run on the inside of the vertical fin. 4—Operating arm on top of upper aileron. At the right is shown a sketch of the unique junction for attaching streamline wires to flexible aileron control cable.

THE DAYTON-WRIGHT CO.'S "T-4 MESSENGER," LIGHT SINGLE SEATER



1—Lower right wing strut socket, showing pulley for aileron cable fitted into the leading edge of the wing. 2—The strip veneer used for cross bracing on the interior of the fuselage. 3—Attachment of upper wing section to the center section. 4—Elevator control lever. 5—Landing chassis fitting showing the streamline aluminum casing for the shock absorber cord.

THE GALLAUDET E-L-2 "CHUMMY FLYABOUT" MONOPLANE



1—Formation of the Gallaudet streamline cables. 2—How the upper part of the landing wheels are fitted into the monocoque body. 3—Right hand shaft drive from the engines to the pusher screw. 4—Bevel gear housing, connecting transverse driving shaft with the longitudinal propeller shaft. 5—Attachment of bracing cables at the cabane

THE TIPS 480 H.P. AERO MOTOR

AIR cooling is provided by means of fins all around the main body of the engine, and nine tubular radiators built between the cylinders. Water circulation is provided around the entire body, cylinders, and inside of the sleeve valve. Water is circulated automatically by a slow rotation (60 revolutions per minute) of the main body, which body serves as a water jacket and radiator. This system eliminates all water hosing and connections.

A decompression valve is also provided in the main body. A special gear arrangement permits to obtain the most efficient speed of crankshaft: 1,800 R.P.M., while the propeller revolves in the same direction at 1,080 R.P.M. The main body travels in an opposite direction at the rate of 60 R.P.M. This special disposition eliminates vibration and prevents gyroscopic action.

The arrangement of the planetary and eccentric gear mechanism provides an effective distribution of the rotary sleeve valves.

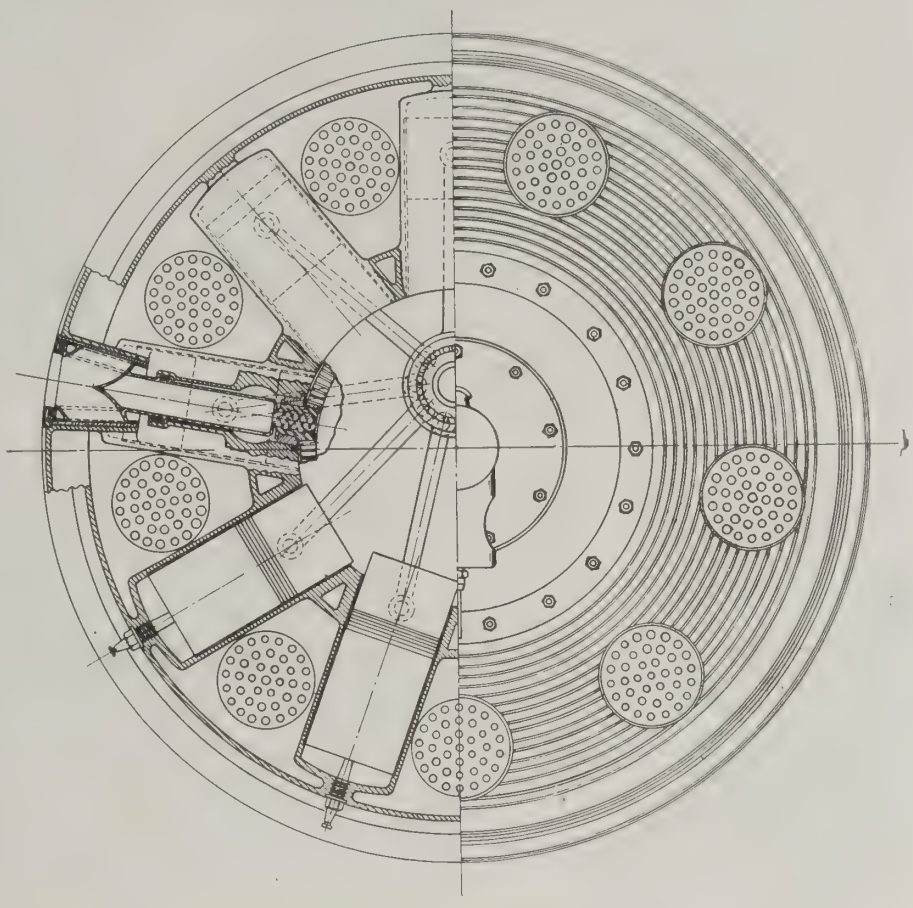
A tapered rotary sleeve valve, water cooled internally, is self-lubricating and automatically self-adjusting. This valve is spiral driven by the main planetary gear mechanism. Each sleeve operates a pair of cylinders for both inlet and outlet. The sleeve housing is of cast iron provided with graphite self-lubricating spots.

Oil for lubrication is forced under pump pressure through the crankshaft and bearings and splashed regularly by the slow rotation of the main body. The carburetor and oil pump body is made of one single aluminum casting.

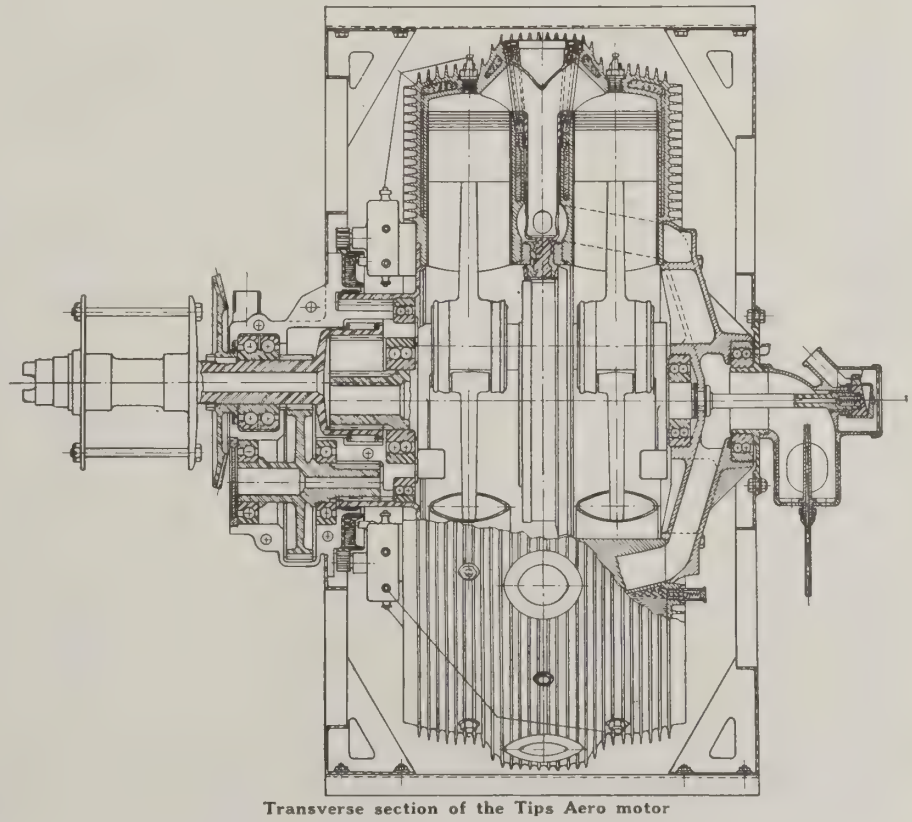
A special design of obturators gives a maximum degree of safety of functionment in the cylinders, provides ideal lubrication and helps to obtain an efficient compression.

The general specifications of the Tips aero motor are as follows:

Number of cylinders.....eighteen
Bore.....4½ inches
Stroke.....6 inches
Max. B.H.P.....480
Weight complete including cooling system .....850 lbs.
R. P. M.....1,800 on crankshaft
R. P. M.....1,080 on propeller
R. P. M.....60 on main body
Consumption gas per hour.....22 gal.
Consumption oil per hour.....3 gal.
Water capacity, main body.....10 gal.
Ratio.....1.333 to 1
Compression ratio..... 1 to 5¼
Volume of one cylinder.....95.426 cu. in.
Total volume of cylinders..1,717.669 cu. in.
Area of one piston.....15.904 sq. in.
Piston speed per minute.....
.....1,799 ft. (30 ft. per sec.)
Vel. of gas on main inlet..141 ft. per sec.
No. of sleeves per pair of cylinders.....1
No. of obturators per piston....3 doubles



Half-section and rear view of the Tip Aero motor



Transverse section of the Tips Aero motor



Brigadier General Theodore C. Lyster and the group of aeronautic authorities who tendered him a luncheon at Aero Club of America

GENERAL LYSTER AWARDED DISTINGUISHED SERVICE MEDAL

BRIGADIER GENERAL THEODORE C. LYSTER, U. S. Air Medical Service, "The Man Who Saved the Lives of Hundreds of Aviators," who was awarded the Distinguished Service Medal by Secretary Baker for his valuable work in establishing the Air Medical Standards and organizing the Air Medical Service in this country and in France, was tendered an important reception at the Aero Club of America, which was attended by famous Allied aces.

General Lyster arrived in New York unexpectedly and went to the Aero Club, which is the headquarters and meeting place of Allied Aviators. The Club had been advised from Washington, that Secretary Baker had awarded General Lyster the D. S. M. in recognition of his valuable work as head of the Air Medical Service, and the Aces and other officers present were just preparing a resolution of appreciation for him when the General walked in the Club.

Those present at the luncheon were: Captain Augustine Lahoulle, the noted French Ace, who arrived in the United States a few days ago. Rear Admiral Bradley A. Fiske, Colonel James Prentice, U. S. Army Balloon Service; Mr. Alan R. Hawley, President of the Club; Henry A. Wise Wood; Captain Jacques Boyriven, the noted French Aviator who flew under all the New York Bridges a few months ago; A. Leo Stevens, Chief Inspector of the U. S. Army Balloon Section; Captain Granville A. Pollock, late of the Lafayette Esquadrille, who has just returned from France where he was in charge of the Orly Station where all aircraft intended for the American Forces were tested; Henry Woodhouse; Lieutenant de Limur, of the French Mission, who went in the war with Captain Lahoulee in 1914; Lieutenant Wainwright Abbott, late of the Lafayette Escadrille; Captain S. Herbert Mapes, U. S. A., the well-known sportsman of Tuxedo Park; Captain M. Idigords, of the Special Guatemala Mission; Augustus Post, Secretary of the Aerial League of America; W. W. Miller, John Hays Hammond, Jr.; G. Douglas Wardrop, Managing Editor of Aerial Age; Captain H. L. King, U. S. Air Medical Service; Captain Robert A. Bartlett, the noted explorer; Ensign Daniel E. Huger, U. S. N., late of the Lafayette Escadrille, who holds the French, Italian and American Military Aviator certificates; Lieut. Ray A. Barnes, U. S. Air Service; Ensign Frank I. Turner, U. S. Naval Aviator, who has just returned from overseas; Lieut. Gilbert M. Whitman, U. S. A.; Evan J. David, of Flying Magazine; Ensign A. A. Beckwith, H. B. Childs, Lieut. Morton B. Downs, U. S. N.; Mr. Walter Camp and others.

In congratulating General Lyster, Mr. Hawley stated that he had been told by Allied authorities that when General Lyster and Lieut. Colonel Isaac H. Jones, of the Air Medical Service, went to France, Italy and England in 1917 and 1918 and brought to the attention of the Allied Governments the U. S. Air Medical tests and system of testing men for the Air Service, those countries were perplexed with the serious problem of casualties in the Air Service due to accidents. General Lyster and Lieut. Colonel Jones proposed a system for testing aviators physically and keeping them in good physical condition, which solved the most difficult problems. It was the system originated by General Lyster and perfected by the U. S. Air Medical Service. Through the application of this system the percentage of casualties from accidents were cut down greatly.

SECOND PAN-AMERICAN AERONAUTIC CONVENTION AND EXHIBITION

To Be Held Under the Auspices of The Aero Club of America, The Aerial League of America and the Pan-American Aeronautic Federation.

From Thursday, May 1st, 1919,
to
June 1st, inclusive,
at
Atlantic City, N. J.

CONTESTS TO BE HELD EACH SATURDAY

(1) Seaplane Contests (general),
(2) Curtiss Marine Flying Trophy and Prizes,
(3) Intercollegiate Seaplane Contests,
(4) Land Aeroplane Contests,
(5) Dirigible Contests,
(6) Kite Balloon Speed in Ascending and Descending, and Maneuvering Contests,
(7) Parachute Competition,
(8) Aviette (bicycles and motorcycles with wings) Contests.

EVERY DAY ACTIVITIES

(1) Exhibits of Aeroplanes, Motors and Accessories on the Steel Pier,
(2) Demonstrations and tests of Seaplanes, Land Aeroplanes, Motors, Dirigibles, Kite Balloons, to prospective purchasers and representatives of different governments,
(3) Aerial Passenger Carrying by seaplanes and dirigibles, and kite balloon ascensions,
(4) Moving pictures and Addresses by leading authorities on most important phases of aeronautics.

The Governments and Aeronautic, Sporting, Scientific, Industrial and Civic organizations of the United States and all the countries in the world, excepting Germany and her allies, are invited to send representatives to attend this great aeronautic event. On arrival in the United States these representatives should call at the Headquarters of the Convention Committee at No. 297 Madison Avenue, New York City, to register and receive their official badges and the official program.

In the event that it is more convenient for them to go directly to Atlantic City they will register at the offices of the Convention located at the following Atlantic City hotels: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis and Hotel Haddon Hall.

Representatives of the Convention Committee will be at the Bureaus of the Aeronautic Convention at the above-named hotels and will issue the official badges which admit the bearer to the Aeronautic Hall, as well as the Aero Exhibition on the Steel Pier, the judges' enclosure during contests, and to the Aerodrome and seaplane stations where the aircraft and motors will be demonstrated.

All communications until May 1st, should be addressed to Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.



DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

THURSDAY, MAY 1ST

Opening of Convention and Exhibit.

AFTERNOON—Reception at Aeronautic Hall on the Steel Pier. Addresses by United States Government State and aeronautic authorities.

EVENING—Aero Show and addresses by officials.

FRIDAY, MAY 2ND

AFTERNOON—Aero Show. Preliminary tests of seaplanes, dirigibles and kite balloons.

EVENING—Moving pictures and address on flying for sport and pleasure.

SATURDAY, MAY 3RD

AFTERNOON—Seaplane and dirigible races, and kite balloon ascending and descending contest.

EVENING—Ball.

SUNDAY, MAY 4TH

MORNING—Memorial service by eminent Divine for the dead airmen.

AFTERNOON AND EVENING—Reception to allied aces and heroes of the air and their parents, and announcement of the award of the Aero Club of America Medal of Valor, and the Aerial League of America Diploma of Honor.

MONDAY, MAY 5TH

AFTERNOON—First parachute contest for $500 Bennett Prize.

EVENING—"The Large Dirigible and Its Value for Transportation." Representatives of railroads, express, steamship and other transportation organizations invited to attend.

TUESDAY, MAY 6TH

AFTERNOON—Illustrated addresses on "Aerial Forest Patrol." Forestry Department of every State invited.

EVENING—"Work of Aerial Police Squadrons, and Why Every City Should Have One."

WEDNESDAY, MAY 7TH

AFTERNOON AND EVENING—Aerial Mail Day. Illustrated address on, and consideration of, "Aerial Mail Planes." Chairman of Post Office and Post Roads Committees of House of Representatives and Senate, and Postmaster General Burleson invited to deliver addresses. (26,000 United States Postmasters, and Chambers of Commerce of 13,000 cities invited to attend.)

THURSDAY, MAY 8TH

AFTERNOON AND EVENING—Illustrated addresses on the "Need of Municipal Aerodromes, and the Part to be Played by Aircraft in City Planning." Chambers of Commerce and City Planning Commissions of 13,000 cities invited to attend.

FRIDAY, MAY 9TH

AFTERNOON—Arrival of seaplanes and army planes from Army and Navy Air Stations. Second parachute competition for the $500 Bennett Prize.

EVENING—Illustrated addresses on "Latest Developments in Aerial Warfare and Adventures in Aerial Warfare," told by famous aces.

SATURDAY, MAY 10TH

AFTERNOON—Army, Navy and Marine Corps Day. Aerial contests and tournament.

EVENING—United States Army and Navy Officers' Reception. Reception and addresses at Aeronautic Exhibition Hall on the Steel Pier.

SUNDAY, MAY 11TH

AFTERNOON AND EVENING—Presentation of the flags by each State of the United States to the Aero Squadrons representing the States. Each State will present a flag to each Aero Squadron, the members of which were overwhelmingly natives of that State. The presentation will be made by representatives from the State and the Aero Club and Aerial League branch of that State. All States and cities invited to send delegates, and Army, Navy and Marine Corps to send representatives.

MONDAY, MAY 12TH

AFTERNOON—Demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night." All national advertisers and advertising agents invited to attend.

EVENING—"Pan-American Aerial Transport Over Land." Addresses by members of the commissions of the 20 Latin-American Republics.

TUESDAY, MAY 13TH

AFTERNOON AND EVENING—"Pan-American Aerial Transport Over Water." Addresses by members of the 20 Latin-American Republics' Commissions.

WEDNESDAY AND THURSDAY, MAY 14TH AND 15TH

AFTERNOONS AND EVENINGS—"The Airways and Aerial Transport in Europe, Canada, Africa, Australia and Asia."

FRIDAY, MAY 16TH

AFTERNOON AND EVENING—"Aerial Navigation Instruments for Flying Over Land and Water." Aviators, navigators, scientific instrument makers and aeronautic experts invited.

SATURDAY, MAY 17TH

AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.

EVENING—Extensive exhibit of aerial photographs and photographic apparatus. All photographers, professional and amateur, and makers of photographic apparatus invited.

SUNDAY, MAY 18TH

AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH

AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."

EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH

AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST

AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.

EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22nd

AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Telegraphic and Climatic Factors in Relation to Aeronautics.

FRIDAY, MAY 23RD

AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulation of Air Traffic." (First day.) Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH

AFTERNOON—Races and contests.

EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH

AFTERNOON AND EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK.

MONDAY, MAY 26TH

AFTERNOON—"Aeronautic Engineering Problems and Their Prospective Solution."

EVENING—Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH

AFTERNOON—"Factors That Increase the Efficiency for Large Dirigibles."

EVENING—"Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH

AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."

EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH

AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."

EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)

AFTERNOON—Dirigible races, kite balloon speed ascending contest; parachute contest.

EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST

AFTERNOON—Seaplanes, land planes and dirigible contests. Aviette competition at which all cyclists and makers of bicycles and motorcycles will be invited.

EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST

AFTERNOON AND EVENING—Award of prizes and diplomas for all events.

PROGRAMME

Deuxième Convention et Exposition Aeronautique Pan-Américaine
Sous les auspices de l' "Aero Club of America," "The Aerial League of America," et la "Pan-American Aeronautic Federation."
Du Jeudi 1 Mai, 1919 au 1 Juin, inclus. à Atlantic City, N. J.

CONCOURS DEVANT ETRE TENUS CHAQUE SAMEDI.

1. **Concours d'hydravions.**
2. **Trophées et Prix Curtiss pour Aviation Navale.**
3. **Concours Intercollegiaux pour Hydravions.**
4. **Concours d'Avions.**
5. **Concours de Dirigeables.**
6. **Concours de rapidité d'ascension, de descente et de manoeuvre pour ballons captifs.**
7. **Concours de Parachutes.**
8. **Aviettes (bicyclettes et motocyclettes munies de voiles).**

EPREUVES QUOTIDIENNES.

1. **Exposition d'Avions, Moteurs et Accessoires sur la jetée d'acier.**
2. **Demonstration et essais d'hydravions, avions, moteurs, dirigeables, ballons captifs, aux acheteurs eventuels.**
3. **Transport de passagers par hydravions et dirigeables, et ascensions en ballons captifs.**
4. **Representations cinématographiques et conférences sur les phases les plus importantes de aéronautique suivant le programme ci-dessous:—**

JEUDI, LER JOUR
Ouverture de la Convention et Exposition.
Après-midi—Réception au Hall de l'Aéronautique sur la jetée d'acier. Discours par des autorités du Gouvernement.
Soir—Des Etats-Unis, et l'Etat et de l'Aeronautique Exposition aeronautique et discours par des personnages officiels.

VENDREDI, 2EME JOUR
Après-midi—Exposition aeronautique. Essais préliminaires. D'hydravions, dirigeables et ballons captifs.
Soir—Représentation cinématographique et conférences sur l'aviation en tant que sport, et agrément.

SAMEDI, 3IEME JOUR
Après-midi—Courses d'hydravions et dirigeables, et concours d'ascension et de descente pour ballons captifs.
Soir—Bal.

DIMANCHE, 4IEME JOUR
Matin—Service pour la mémoire des aviateurs morts.
Après-midi, et soirée—Réception des As Alliés et Héros de l'air et de leur familles. Remise de la Médaille de Valeur de l'Aero Club d'Amérique et du diplome d'Honneur de la Ligue Aérienne d'Amérique.

LUNDI, 5IEME JOUR
Après-midi—Premier concours de Parachutes pour le Prix Bennett de $500.00.
Soir—Le grand dirigeable et sa valeur au point de vue transport. Les représentants des Compagnies de chemin de fer, d'Express, de Navigation et autres organisations de transports, sont invités à y assister.

MARDI, 6IEME JOUR
Après-midi—Conférences, accompagnées de projections sur la surveillance aérienne des forets. (Les membres du département forestier de chaque Etat sont invités).
Soir—Le rôle des escadrilles de police aérienne, et pourquoi chaque ville devrait en posséder.

MERCREDI, 7IEME JOUR
Après-midi—Journée de la poste aérienne. Conférences avec projections; considérations sur les avions postaux. Le Président du Comité des bureaux de poste et des voies postales au Sénat et à la chambre, et le Directeur Général des Postes, Burleson, sont invités à prononcer des discours. (26000 Directeur des Postes des Etats-Unis et des représentants des Chambres de Commerce de 13,000 villes y sont invités.)

JEUDI, 8IEME JOUR
Après-midi et soir—Discours avec projections sur la nécessité d'Aerodromes municipaux, et la part qui sera joué par l'aviation dans le "City Planning". (Les chambres de commerce et les commissions de City-planning" de 13000 villes sont invités.)

VENDREDI, 9IEME JOUR
Après-midi—Arrivée d'avions et hydravions militaires de leurs différents centres. Deuxième concours de Parachutes pour le prix Bennett de 500 dollars.
Soir—Conférences avec projections par des As célèbres, sur les derniers développements de la guerre aérienne et sur leurs aventures personneles.

SAMEDI, 10IEME JOUR
Après-midi—Journée, de la Marine et des fusillers marins. Concours aériens.
Soir—Réception d'officiers de l'Armée et de la Marine Américaine. Réception et discours au hall de l'Exposition Aeronautique sur la Jetée d'Acier.

DIMANCHE, 11IEME JOUR
Après-midi et soir—Presentation de drapeaux par chaque Etat des Etats Unis au escadrilles représentant les Etats-Chaque Etat offrira un drapeau à chaque escadrille dont la majorité des membres sont originaires de cet Etat. La présentation sera faite par les représentants, de l'Etat, de l'Aero Club, et de la branche de la Ligue Aérienne de cet Etat. (Tous les Etats et villes sont invités à envoyer des délégués, et l'Armée et la Marine à envoyer des représentants.)

LUNDI, 12IEME JOUR
Après-midi—Démonstration et conférences avec projections sur la valeur de l'Avion pour la publicité diurne et nocturne (Tous les agents et sociétés de publicité sont invités).
Soir—Transport aérien continental, Pan-Américaine. Discours par des membres des commissions de 20 Républiques latines-Américaines.

MARDI, 13IEME JOUR
Après-midi et soir—Transport aérien intercontinental Pan-Américaine. Discours par des membres des commissions de 20 Républiques Latines-Américaines.

MERCREDI ET JEUDI, 14IEME ET 15IEME JOUR
Après-midi et soir—Les voies aériennes et le transport aérien en Europe au Canada en Afrique en Australie et en Asie.

VENDREDI, 16IEME JOUR
Après-midi et soir—Instruments de Navigation aérienne pour voler au-dessus de la terre ou de l'eau (aviateurs, navigateurs, fabricants, d'instruments scientifiques et experts en aeronautique invités).

SAMEDI, 17IEME JOUR
Après-midi—Courses et concours aériens. Conférences et projections sur la photographie aérienne.
Soir—Exposition de photographies aériennes et d'appareils photographiques (Les photographes, professionels, et amateurs, et les fabricants d'appareils photographiques sont invités).

DIMANCHE, 18IEME JOUR
Après-midi et soir—Conférences sur la nécessité d'une attitude pluslarge en regard de l'assurance pour l'avion et les aviateurs.
Soir—Conférences avec projections. Comme quoi les mesures médicales et les inspections en vigueur dans l'armée diminuent les accidents. (Agents et compagnies d'assurance, invités).

MARDI, 20IEME JOUR
Après-midi et soir—Conférences avec projections, montrant les différentes routes aériennes pour traverser l'Atlantique, et les problèmes à résoudre pour accomplir la chose.

MERCREDI, 21IEME JOUR
Après-midi—Journée de la sureté de l'aviation. Discussions des mesures prises pour la sureté de l'aviation. Améliorations dans la construction d'avions. Sureté augmentée dans les moteurs d'avions. Dispositifs pour la sureté en vol.
Soir—Progrès faits dans l'art du pilotage d'avions. (Projections).

JEUDI 22IEME JOUR
Après-midi et soir—Conférences et discussions sur la Meteorologie. Comme quoi les bulletins meteorologiques peuvent être étendues et rendus plus efficaces par l'emploi de l'avion pour explorer les plus hautes couches de l'atmosphère. Comme quoi ces bulletins météorologiques sont d'assistance à la navigation aérienne. Les facteurs climatérique et télégraphiques et leur relations à l'aeronautique.

VENDREDI, 23IEME JOUR
Après-midi et soir—Conférences sur la jurisprudence aérienne. Lois et reglements sur le trafic aérien (1er jour). Avocats, commissaires de trafic, autorités de police de différents pays, invités.)

SAMEDI, 24IEME JOUR
Après-midi et soir—Courses et concours. Conférences avec projections sur la necessité d'etablir un niveau d'altitude pour la circulation aérienne, internationale, interstate et interurbaine.

DIMANCHE, 25IEME JOUR
Après-midi et soir—Journée artistique de l'Aéronautique. Discours sur la peinture et la sculpture aérienne; et exposition de peintures par Lieut. Farré, Lt. Ruttan et autres. (Artistes, Directeurs de Galleries d'Art et amateurs d'oeuvres artistiques, invités.)

LUNDI, 26IEME JOUR
Après-midi et soir—Problèmems aéronautiques et leurs solutions probables Ouverture du concours pour les idées et projets de grands avions.

MARDI, 27IEME JOUR
Après-midi—Facteurs qui augmentent l'efficacité des grands dirigeables.
Soir—Les avantages du plaquage et contre-plaquage dans la construction d'avion.

MERCREDI, 28IEME JOUR
Après-midi—Conférences sur le problème du vol à une altitude de ou supérieure à 25000 pieds et leur solutions probables.
Soir—Les moteurs d'avions actuels.

JEUDI, 29IEME JOUR
Après-midi—Hydravions versus avions pour le sport et le transport.
Soir—Concours pour les idées et projets de grands avions.

VENDREDI, 30IEME JOUR—"Memorial Day".
Après-midi—Courses de dirigeables; concours de rapidité d'ascension pour ballons captifs; concours de parachutes.
Soir—Réception au Hall de l'Aeronautique. Jetée d'acier.

SAMEDI, 31IEME JOUR
Après-midi—Concours d'avions, d'hydravions et de dirigeables. Concours d'aviettes auquel les cyclistes et les fabricants de cycles et motorcyclettes seront invités.
Soir—Aptitudes médicales pour les aviateurs de paix et de guerre. Rapports de différents pays, illustrés par des films intéressants (50,000 autorités médicales invités.)

DIMANCHE, 32IEME JOUR
Après-midi et soir—Remise des prix et diplômes pour tous concours et courses.

Le Gouvernement Français, les organisations aéronautiques, sportives, scientifiques, industrielles, et civiques de France sont invités à envoyer des représentants pour assister à cette grande convention aéronautique. En arrivant aux Etats Unis, ces représentants sont invités à se présenter à l'Etat Major du Comité de la Convention, au numéro 297, Madison Avenue, à New York pour se faire inscrire et recevoir leur insigne et le programme officiel.

Au cas où il leur serait plus facile de se rendre directement à Atlantic City, ils pourront s'y faire inscrire aux bureaux de la Convention, situés à l'un des Hotels suivants: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis, et l'Hotel Haddon Hall.

Des représentants du Comité de la Convention seront aux bureaux de la convention aux hotels ci-dessus et délivreront les insignes officiels qui admettront les porteurs au Hall de l'aéronautique, à l'exposition sur la jetée d'acier, au stand des juges, pendant les concours, et à l'aérodrome et au centre d'hydravion où moteurs et machines seront démontrés.

Toutes comunications jusqu'au ler mai, devront être adressées au: Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

LA SEGUNDA CONVENCION Y EXPOSICION AERONAUTICA PAN-AMERICANA

Celebrada Bajo Los Auspicios del "Aero Club of America," "The Aerial League of America" y "The Pan-American Aeronautic Federation".

Desde el Jueves Primero de Mayo Hasta el Primero de Junio, Ambos Inclusives de 1919 En Atlantic City, Estado de New Jersey, Estados Unidos de America

PROGRAMA

Concursos Que se Verificaran Todos Los Sabados:

(1) **Concurso de Hidroaeroplanos (en general).**
(2) **Trofeo y Premios de Curtiss por Aviacion Maritima.**
(3) **Concurso de Hidroplanos Entre Universidades.**
(4) **Concurso de Aeroplanos Terrestres.**
(5) **Concurso de Globos Dirijibles.**
(6) **Concurso de Globos Sobre Velocidad en Ascender y Descender y sus Maniobras.**
(7) **Concurso de Paracaidas.**
(8) **Concurso de "Aviettes" (bicicletas y motocicletas con alas).**

Programa Diario

(1) **Exhibición de Aeroplanos, Motoras y sus Accesorias en el "Steel Pier."**
(2) **Demostracion y Ensayos de Hidroaeroplanos, Aeroplanos Terrestes, Motoras, Globos Dirijibles y Globos Cautivos, Para Compradores.**
(3) **Ascencion de Hidroplanos y Dirijibles con Pasajeros y Globos Cautivos.**
(4) **Vistas Cinematografas y Discursos Sobre Las Fases Mas Importantes de la Aeronautica, Como Siguen:**

JUEVES PRIMER DIA

Apertura de la Convencion y Exposicion

EN LA TARDE—Recepcion en el salon aeronautico en el "Steel Pier." Discursos de los funcionarios del gobierno de los estados Unidos de America, del estado y de las sociedades aeronauticas.

EN LA NOCHE—Exposicion aeronautica y discursos de funcionarios.

VIERNES SEGUNDA DIA

EN LA TARDE—Exposicion aeronautica, ensayos preliminares de hidroplanos y globos dirijibles y cautivos.

EN LA NOCHE—Vistas cinematografas y discursos sobre aviacion de sport y paseo.

SABADA TERCER DIA

EN LA TARDE—Carreras de hidroaeroplanos y globos dirijibles y concurso en ascender y descender de globos cautivos.

EN LA NOCHE—Gran baile.

DOMINGO CUARTO DIA

EN LA MANANA—Serivios conmemorativos en honor de los aviadores difuntos por un prelado distinguido.

EN LA TARDE Y NOCHE—Recepcion a los aviadores mas renombrados aliados y a sus familiares y entrega de la medalla de valor del "Aero Club de America" y del diploma de honor de la "Aerial League de America."

LUNES QUINTO DIA

EN LA TARDE—Primer concurso de paracaidas por el premio de quinientos dollars de bennett.

EN LA NOCHE—El gran globo dirijible y su valor en la transportacion. Representantes de las empresas de ferrocarril, expreso, vapores y demas de transportes quedan invitados para asistir.

MARTES SESTO DIA

EN LA TARDE—Discursos con ilustraciones, de patrulla aeria de montes. (El departamento de montes de cada estado queda invitado.)

EN LA NOCHE—Trabajo de vigilancia policiaca aeria y razones por las cuales toda ciudad debe tener esta clase de servicio.

MIERCOLES SEPTIMO DIA

EN LA TARDE Y NOCHE—Dia de correos aerios. Discursos con ilustraciones y estudio de aeroplanos para servicio de correos. El presidente de la comision de correos de la camara de representantes y el de igual comite del senado asi como el ministro de comunicaciones de los Estados Unidos Sr. Burleson. Quedan invitados para dirijir la palabra. (Veinte seis mil administradores de coreo de los Estados Unidos y las camaras de comercio de trece mil ciudades quedan invitados para asistir.)

JUEVES OCTAVO DIA

EN LA TARDE Y NOCHE—Discursos con ilustraciones sobre las necesidades de aerodromos municipales y de la parte que debe tomar la aeronautica en los proyectos de ciudades. (Las camaras de comercio y las comisiones de proyectos de ciudades de 13,000 ciudades quedan invitadas para asistir.)

VIERNES NOVENO DIA

EN LA TARDE—Llegada de hidroplanos y aeroplanos del ejercito y la Marina de sus respectivas estaciones. Segundo concurso de paracaidas por el premio de $500 de Bennett.

EN LA NOCHE—Discursos con ilustraciones de los mas recientes desarollos en la guerra aeria y hazañas relatadas por famosos aviadores.

SABADO DECIMO DIA

EN LA TARDE—Dia del Ejercito y Marina. Concurso aeronautico.

EN LA NOCHE—Recepción a los oficiales de la Marina y Ejercito de los Estados Unidos. Recepción y discursos en el Salón de Exhibición Aeronautica en el "Steel Pier."

DOMINGO ONDECIMO DIA

EN LA TARDE Y NOCHE—Presentación de banderas por cada uno de los Estados de los Estados Unidos de America a sus respectivos escuadrones aereos. Cada Estado presentará una bandera al escuadron aereo respectivo que contenga el mayor número de naturales de aquel estado. La presentación se hara por los representantes del estado y del Club Aereo y Liga Aeria de aquel Estado. (Todos los Estados y ciudades quedan invitados para enviar sus delegados y el ejercito y marina para enviar representantes.)

LUNES DUODECIMO

EN LA TARDE—Demostraciones y discursos con ilustraciones sobre el valor de la aeronautica para anuncios de dia y de noche. (Todas personas y agentes dedicados al negocio de anuncios quedan invitados para asistir.)

EN LA NOCHE—Transporte aereo terrestre Pan-Americano. Discursos por los miembros de las Comisiones de las veinte Republicas Pan-Americanas.

MARTES DECIMO-TERCERO

EN LA TARDE Y NOCHE—Transporte aereo maritimo Pan-Americano. Discursos por los miembros de las Comisiones de las veinte Republicas Pan-Americanas.

MIERCOLES Y JUEVES DIAS 14 Y 15

EN LA TARDE Y POR LA NOCHE—Dias y transportes aereos en Europa, Canada, Africa, Australia y Asia.

VIERNES DIA 16

EN LA TARDE Y POR LA NOCHE—Instrumentos para la aviación terestre y marítima. (Aviadores, navegadores, fabricantes de instrumentos cientificos y peritos en aeronautica quedan invitados.)

SABADO DIA 17

POR LA TARDE—Carreras y concursos aereos. Discursos con ilustraciones sobre la fotografia aerea.

POR LA NOCHE—Exhibición extensa de fotografias aereas y aparatos fotográficos. (Fotografos, tanto los profesionales como los afisionados y fabricantes de aparats fotograficos quedan invitados.)

DOMINGO DIA 18

EN LA TARDE Y POR LA NOCHE—Discursos con ilustraciones sobre la exploración aerea y el uso de la aereonave para estudios geodéticos y de costas.

LUNES DIA 19

EN LA TARDE Y POR LA NOCHE—Discursos sobre la necesidad de un concepto mas ámplio relativo al seguro de aereonaves y aviadores.

POR LA NOCHE—Discursos con ilustraciones sobre la manera en que los requisitos e inspección medico-militares disminuyen el número de accidentes. (Compañias de seguros y agentes quedan invitados.)

MARTES DIA 20

EN LA TARDE Y POR LA NOCHE—Discursos con ilustraciones mostrando diferentes modos de cruzar el Mar Atlantico por el aire y los problemas que deben resolverse para realizar dicho objeto.

MIERCOLES DIA 21

EN LA TRADE—Dia de Seguridad Aerea. Discusiones sobre las disposiciones hechas para la sceguridad aerea; mejoras en la construcción de aeroplanos; aumento de estabilidad en las motoras aereas; divisas para aumentar la seguridad aerea.

EN LA NOCHE—Progreso realizado en el manejo de los aeroplanos (con ilustraciones).

JUEVES DIA 22

EN LA TARDE Y NOCHE—Discursos y discusiones sobre metereología-manera de extender los informes metereologicos y hacerlos mas eficaces mediante el uso de aeronaves en la exploración de las altas regiones del aire así como la manera en que los pronosticos metereologicos pueden ser de auxilio en la navegación aerea; y factores telegraficos y climaticos en relación a la aeronautica.

VIERNES DIA 23

EN LA TARDE Y NOCHE—Discursos sobre la jurisprudencia aerea-leyes aereas y reglamentación del trafico aereo (primer dia). (Abogados Jefes de Trafico y Autoridades Policiacas de los distintos paises quedan invitados.)

SABADO DIA 24

EN LA TARDE—Carreras y concursos.

EN LA NOCHE—Discursos con ilustraciones sobre la necesidad de establecer lineas de altitud para viajes internacionales, entre los estados y entre las ciudades por medio del aire.

DOMINGO DIA 25

EN LA TARDE Y NOCHE—Da de Arte Aeronautica. Discurso sobre la pintura y escultura aeronautica de los distintos paises y exhibición de los cuadros aereos por el Teniente Farré, Teniente Ruttan y otros. (Artistas prominetes y directores de Salones de Artes y demás interesados quedan invitados.)

SEMANA DE INGENIERIA.

LUNES DIA 26

EN LA TARDE—Problemas de ingenieria aeronautica y su porspectiva solución.

EN LA NOCHE—Apertura del Concurso para diseños e ideas sobre grandes aeroplanos.

MARTES DIA 27

EN LA TARDE—Factores que contribuyen al aumento de la eficiencia de los grandes globos dirijibles.

EN LA NOCHE—Ventajas de enchapear y de la madera denominada "plywood" en la construcción de aereonaves.

MIERCOLES DIA 28

EN LA TARDE—Discursos sobre los problemas de volar a una altura de 25,000 pies y mas, y su solución prospectiva.

EN LA NOCHE—Máquinas aereas de la actualidad.

JUEVES DIA 29

EN LA TARDE—Tema: "Flying-boats" contra hidroplanos para sport y transporte.

EN LA NOCHE—Concurso sobre diseños e ideas para grandes aeroplanos.

VIERNES DIA 30

EN LA TARDE—Carreras entre globos dirijibles, concurso de velocidad de ascender y descender de globos cautivos; concurso de paracaidas.

EN LA NOCHE—Recepción en el Salón Aeronautico en el "Steel Pier."

SABADO DIA 31

EN LA TARDE—Concursos de hidroplanos, aeroplanos, y globos dirijibles. Concurso de "Aviettes" al cual serán invitados todos los biciclistas y fabricantes de bicicletas y motocicletas.

EN LA NOCHE—Requisitos medicos para aviadores en tiempo de guerra y de paz. Informes de distintos paises ilustrados con vistas cinematografas de atractivo. (50,000 medicos quedan invitados.)

DOMINGO DIA 32.

EN LA TARDE Y NOCHE—Presentación de premios y diplomas de todos los concursos.

Los Gobiernos de la Argentina, Brasil, Bolivia, Chile, Colombia, Costa Rica, Cuba, República Dominicana, Ecuador, Honduras, Haití, Panamá Guatemala, Paraguay, Perú, Portugal, El Salvador, Espaňna, Uruguay, Venezuela, Mejico, y Nicaragua, asi como las Sociedades Aeronaúticas, Deportivas, Cientificas, Industriales y Cívicas, de los mismos paises, por la presente quedan invitadas para enviar representantes a asistir a eete gran concurso aeronaútico. Dichos representantes a su llegada a los Estados Unidos deberán presentarse a la oficina principal del Comité encargado de la Convención, en el número 297 Avenida de Madison, en la ciudad de New York, para inscribirse y al proprio tiempo recibir sus credenciales y copia del programa oficial.

En el caso de que les sea mas conveniente a algunos de los representantes ir directamente a Atlantic City, dichos señores podrán inscribirse en las oficinas de la Convención que estarán constituidas en dicho lugar en los siguientes hoteles: "Traymore," "Chalfonte," "The Breakers," "St. Charles," "Marlborough-Blenheim," "Chelsea," "Alamac," "Dennis" y "Haddon Hall." En Comité de la Convención tendrá representantes en las oficinas de la Convención Aeronaútica en dichos hotelesquienes expedirán las credenciales o chapas oficiales de entrada al portador para el Salón Aeronaútico, la Exposi-ción Aeronaútica en el "Steel Pier," la sección apartada para los Jueces durante el concurso, y al "Aerodromo" yestaciones para hidroaeroplanos donde habrán exhibiciones de aeronaves y sus motoras.

Sírvase dirijir todas sus comunicaciones hasta el primero de Mayo Próximo venidero, al Sr. Contraalmirante Peary, en la forma siguiente: Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

SECONDA CONVENZIONE ED ESPOSIZIONE AEREONAUTICA PAN-AMERICANA

Sotto gli Auspici dell'Aero Club of America, dell'Aerial League of America e della Federazione Aeronautica Pan-Americano

Dal Primo Maggio 1919, al Primo Giugno incluso,

ad

Atlantic City, N. J.

PROGRAMMA

GARE CHE AVRANNO LUOGO OGNISABATO

(1) Gare Idroplani (generale).
(2) Voli nautici apparecchio tipo Curtiss-Trofei e Premi.
(3) Gare Idroplani (Universita).
(4) Gare Aeroplani di terra.
(5) Gare Dirigibili.
(6) Gare Velocita ascesa e discesa, e manovre di Palloni frenati.
(7) Gare Paracadute.
(8) Aviette (Velocipedi e motocicli alati).

AVVENIMENTI QUOTIDIANI

(1) Esposizione di Aeroplani, Motori ed accessori sullo Steel Pier (Ponte d'Acciaio).

(2) Esercitazioni e prove idroplani, Aeroplani di terra, motori, Dirigibili, Palloni frenati.

(3) Trasporto Aereo passeggeri su Idroplani, e Dirigibili-Ascensioni Palloni frenati.

(4) Spettacolo cinematografico e discorsi sul elpiu importanti fasi dell'Aereonautica, nell'ordine seguente:

GIOVEDI, 1MO GIORNO

Apertura Convenzione ed Esposizione.

POMERIGGIO—Ricevimento nella Sala Aereonautica sullo Steel Pier. Conferenze Autorita Federali, Statali, ed Aereonautiche.

SERA—Esposizione Aereonautica e discorsi ufficiali.

VENERDI, 2DO GIORNO

POMERIGGIO—Esposizione Aereonautica—p r o v e preliminari, idroplani, Dirigibili, e Palloni Frenati.

SERA—Cinema e conferenza-soggetto "Aereonautica Sportiva."

SABATO, 3O GIORNO

POMERIGGIO—Corse Idroplani e dirigibili; gare di velocitá ascesa e discesa Palloni frenati.

SERA—Ballo.

DOMENICO, 4TO GIORNO

MATTINO—Un eminente Ecclesiastico commemorerá gli Aviatori defunti.

POMERIGGIO E SERA—Ricevimento "Assi" alleati ed eroi dell'Aria e loro parenti—Annunzio conferimento medaglia al valore dell'Aero Club of A. e diploma d'onore dell'Aerial League of America.

LUNEDI, 5TO GIORNO

POMERIGGIO—Prima Gara Paracadute. Premio Bennett $500.

SERA—Il Dirigibile di grosse dimensioni e la sua utilitá per trasporti. Sono invitati i Sigg. Rappresentanti delle ferrovie, dell Compagnie di Express, delle Compagnie di Navigazione e di altri servizi-trasporti.

MARTEDI, 6TO GIORNO

POMERIGGIO—Conferenze con proiezioni sulla "Guardia Forestale Aerea" (Sono invitati i rappresentanti dei Dipartimenti forestali di ogni Stato.)

SERA—Polizia aerea (squadre) e le ragioni per le quali ogni cittá dovrebbe averne una.

MERCOLEDI, 7MO GIORNO

POMERIGGIO E SERA—Giornata "Posta Aerea". Conferenza con proiezioni—Considerazioni su la "posta aerea". Sono invitati a parlare: il Capo del Comitato ufficio Posta e servizio Stradale della Camera di Deputati e del Senato e il Direttore Generale della Posta, Sig. Burleson (26,000 impigati postali ed i rappresentanti delle Camere di Commercio di 13,000 cittá).

GIOVEDI, 8VO GIORNO

POMERIGGIO E SERA—Conferenza con proiezioni sulla necessitá di costruire aerodromi municipali e sull agrande influenza che gli aeroplani avranno nella costruzione e nello svliuppo delle nuove cittá. (Sono invitati i Commissari delle Camere di Commercio e degli uffici Planimetrici municipali di 13,000 cittá.)

VENERDI, 9O GIORNO

POMERIGGIO—Arrivo di Odroplani e di aeroplani dell'esercito da stazioni aeree dell'esercito e della marina. Seconda gara paracadute premio Bennett $500.00.

SERA—Conferenza con proiezioni sui recentissimi progressi della lotta aerea narrate da famosi "Assi."

SABATO, 10MO GIORNO

POMERIGGIO—Giornata in onore dell'esercito e della Marina—Gare Aeree e tornei.

SERA—Ricevimenti Sigg. Ufficiali dell'Esercito e della S. U. Trattenimento e discorsi nella sala dell'-Esposizione Aereonautica sullo Steel Pier.

DOMENICA, 11MO GIORNO

POMERIGGIO E SERA—Presentazione delle bandiere da parte di ciascun Stato degli S. U. alle squadre aeree che li rappresentano. Ciascun Stato presentera una bandiera a ciascuna squadra aerea, i membri della quale saranno possibilmente tutti nativi dello Stato che rappresentano. I rappresentanti delle succursali in ogni Stato dell'-Aereo Club e dell'Aerial League faranno tale rappresentazione. (Ciasun Stato e ciascuna cittá saranno invitati a mandare delegati e l'Esercito e la Marina a mandare rappresentanti.)

LUNEDI, 12MO GIORNO

POMERIGGIO—Conferenze illustrate sul valore della macchine deree come mezzi di "reclame" di giorno e di notto. (Sono invitati tutte le compagnie di pubblicita nazionali ed estere.)

SERA—Trasporto Aereo Pan-Americano su terra. Conferenze di membri delle Commissioni delle venti repubbliche America-latine.

MARTEDI, 13MA GIORNATA

POMERIGGIO E SERA—Trasporto Aereo Pan-Americano sopra acqua. Conferenze di membri delle Commissioni delle venti repubbliche Americo-Latine.

MERCOLEDI, E GIOVEDI, 14MO E 15MO GIORNO

POMERIGGIO E SERA—Le Vie Aeree ed il Trasporto Aereo in Europa, Canada, Africa, Australia ed Asia.

VENERDI, 16MO GIORNO

POMERIGGIO E SERA—Istrumenti di navigazione Aerea per voli sopra terra e sopra mare. (Sono invitati aviatori, naviganti, fabbricanti strumenti scientifici a periti aereonautici.)

SABATO, 17MO GIORNO

POMERIGGIO—Corse e gare aerenautiche. Conferenze con proiezioni sul l'Arte Fotografica Aerea.

SERA—Esposizione su vasta scala di Fotografie Aeree e di apparati fotografici. (Sono invitati tutti i fotografi, professionisti e dilettanti, e fabbricanti di apparati fotografici.)

DOMENICA, 18MO GIORNO

POMERIGGIO E SERA—Conferenze Illustrate con proiezioni sull'Esplorazione Aerea e sull'uso di velivoli per le misurazioni costiere e geodetiche.

LUNEDI, 19MO GIORNO

POMERIGGIO—Conferenze sul bisogno di un miglior trattamente da parte delle Compagnie d'Assicurazione nelle condizioni di assicurazione delle macchine e degli aviatori.

SERA—Conferenze con proiezioni sull'influenza che i sistemi del Corpo Medico dell'Esercito hanno sulla diminuzione delle disgrazie. (Sono invitati tuttigli agenti delle Compagnie di Assicurazione.)

MARTEDI, 20MO GIORNO

POMERIGGIO E SERA—Conferenze Illustrate indicanti i vari modi gi studiati per attraversare l'Atlantico nell'Aria—ostacoli da vincere, problemi da risolvere per poter compiere felicemente il viaggio.

MERCOLEDI, 21MO GIORNO

POMERRIGIO—Giornata dedicata alla sicurezza Aerea—Discussioni su provvedimenti presi per la sicurezza Aerea—Perfezionamenti nella costruzione degli aereoplani; Aumentata sicurezza di motori aerei; congegni atti a migliorare la stabilitá dei voli.

SERA—Progressi fatti nell'arte dei piloti aviatori. (Illustrazioni.)

GIOVEDI, 22MO GIORNO

POMERIGGIO E SERA—Conferenze e discorsi di meteorologia; come possono essere fatte piu esattamente le previsioni meterorologiche esplorando l'aria con velivoli negli strati superiori, e come queste previsioni meteorologiche possono essere utili alla nagivazione aerea—Fattori telegrafici e climatici in relazione all'Aereonautica.

VENERDI, 23MO GIORNO

POMERIGGIO E SERA—Conferenze sulla giurisprudenza aerea; leggi e regolamenti per il traffico Aereo. (Avvocati, Commissario di traffico, Autorita di Polizia dei differenti paesi invitati.)

SABATO, 24MO GIORNO

POMERIGGIO E SERA—Corse e gare—Conferenze illustrate sul bisogno di stabilire un livello di altezza per il traffico aereo internazionale, interstatale, e interurbano.

DOMENICA, 25MO GIORNO

POMERIGGIO E SERA—Giornata d'Arta Aeronautica. Conferenze sulla Pittura e sulla Scultura di ogni paese su soggetti d'Aereonautica. Esposizione di quadri di soggetto dei tenenti Farre, Ruttan, e di altri. (Sono invitati tutti i piú Valenti artisti, i direttori di Gallerie d'Arte e gli amatori d'Arte.)

SETTIMANA DEDICATA ALLA "MECCANICA"

LUNEDI, 26MO GIORNO

POMERIGGIO—Problemi di meccanica aeronautica e la loro probabile soluzione.

SERA—Apertura di un concorso—disegni ed idee per la costruzione di grandi aeroplani.

MARTEDI, 27MO GIORNO

POMERIGGIO—Fattori che possono aumentare l'efficienza di grandi dirigibili.

SERA—Vantaggi del legno compensato per la costruzione di velivoli.

MERCOLEDI, 28MO GIORNO

POMERIGGIO—Conferenze sui problemi che si affacciano per voli a 25,000 piedi a piu e la loro probabile soluzione.

SERA—Macchine aere d'oggi.

GIOVEDI, 29MO GIORNO

POMERIGGIO—Battelli volanti contro Idroplani per Sport e per trasporti commerciali.

SERA—Gare—Disegni ed idee per aeroplani di grandi dimensioni.

VENERDI, 30MO GIORNO (Giorno Commemorativo)

POMERIGGIO—Corse Dirigibili—Gare di velocita d'ascensione tra palloni frenati—Gara paracadute.

SERA—Grande ricevimento nella Aereonautic Hall, Steel Pier.

SABATO, 31MO GIORNO

POMERIGGIO—Gare tra idroplani, aereoplani dirigibili—Gara Aviette alla quale interveranno tutti i ciclisti ed i fabbricanti di biciclette e di motociclette.

SERA—Sistemi e regolamentari medici internazionali per aviatori in guerro ed in pace. Relazioni sui sistemi adottati nei differenti paesi, illustrate da interessanti proiezioni. (Sono invitati 50,000 Sanitari.

DOMENICA, 32MO GIORNO

POMERIGGIO E SERA—Distribuzione generale dei diplomi.

Il Governo d'Italia e le organizzazioni italiane di Aeronautica di Sport e di Scienze sono invitati a mandare rappresentanti ad assistere a questo grande evento aereonautico. Arrivando negli Stati Uniti i Signori Rappresentanti dovranno presentarsi al Quartiere Generale del Somitato al N. 297 Madison Ave., N. Y., per registrarsi e ricevere la targhetta ufficiale, nonché il programma.

Nel caso fosse per loro piú conveniente recarsi direttamente ad Atlantic City, potranno registrarsi colá presso gli uffici situati nei seguenti alberghi: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis and Hotel Haddon Hall.

I Rappresentanti del Comitato di Convenzione si troveranno negli uffici della Convenzione Aereonautica nei sunnominati Alberghi e distribuiranno i distintivi ufficiali che daranno al portatore il diritto di essere ammesso all'Aereonautic Hall, all'Esposizione sullo Steel Pier, nel recinto occupato dai giudiei durante la gara, all'Aerodromo, all stazione degli idroplani dove saranno esibiti i velivoli ed i motori.

Ogni comunicazione sino al primo Marzo dovrá essere indirizzata al Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, N. 297 Madison Ave., New York.

THE LIBERTY MAGNETO

PRIOR to the entry of the United States into the War, comparatively little constructive work had really been accomplished in this country in developing a magneto suitable for the high speed, multi-cylinder engines required for aircraft service.

One of the first and most important problems confronting the designers of the "Liberty" engine was to provide a dependable and entirely satisfactory system of ignition. While practically all engineers were agreed that a suitable magneto afforded the most desirable source for the ideal ignition system, current history and the result of the tests of magnetos submitted clearly indicated that so far no magneto was available that could be readily mounted on and would successfully meet the exacting requirements of the twelve cylinder "Liberty" engine, therefore the battery-generator system of ignition was reluctantly adopted.

It remained for the engineers of the Berkshire Magneto Company to finally solve the problem with a very unique development of their high tension, inductor type magneto, so designed that it was mechanically interchangeable with the distributor heads of the original system.

The service tests to which these special magnetos have been subjected since last November prove that they not only function perfectly, but start the engine easier, appreciably increase the horse power and efficiency, reduce vibration and eliminate the many well recognized, inherent limitations of the generator-battery system.

In appearance the Liberty magneto more nearly resembles a small fractional horse power motor, as it is cylindrical in form, 6½" in diameter, 7¾" long and weighs less then seventeen pounds.

Briefly described, it consists of a cylindrical aluminum frame within which is mounted an aluminum field casting with four sets of laminated steel inserts for pole pieces.

The four poles of the field are not conventionally arranged as in standard practice, but are located alternately 67½ and 112½ degrees from each other to coordinate with the angular spacing of the engine. This arrangement allocates each spark in the most efficient part of the generated wave.

Attached to and on opposite sides of the field casting are two nearly semicircular tungsten steel magnets, the ends of which abut each other in the center of one pair of pole shoes.

The stationary coil, which is supported by two projections from one set of field poles, is assembled on a laminated core on which the primary and secondary coils of enamel insulated wire are wound. The entire unit being thoroughly impregnated, after final assembly, with a special compound applied in a vacuum.

A two-pole armature, arranged for four sparks per revolution, built up of steel punchings and assembled on a hollow shaft, is carried on two very substantial ball bearings, one of which is rigidly attached to a flange on the inside of the main frame, while the other is pressed into an aluminum plate attached to the outer end of the field casting, which plate also serves to carry the interrupter and condenser.

A metal interrupter of simple design and extremely light in weight is operated by a self-lubricated metal cam provided with a special contour to correspond with the requirements of the angular spacing of the cylinders of the engine.

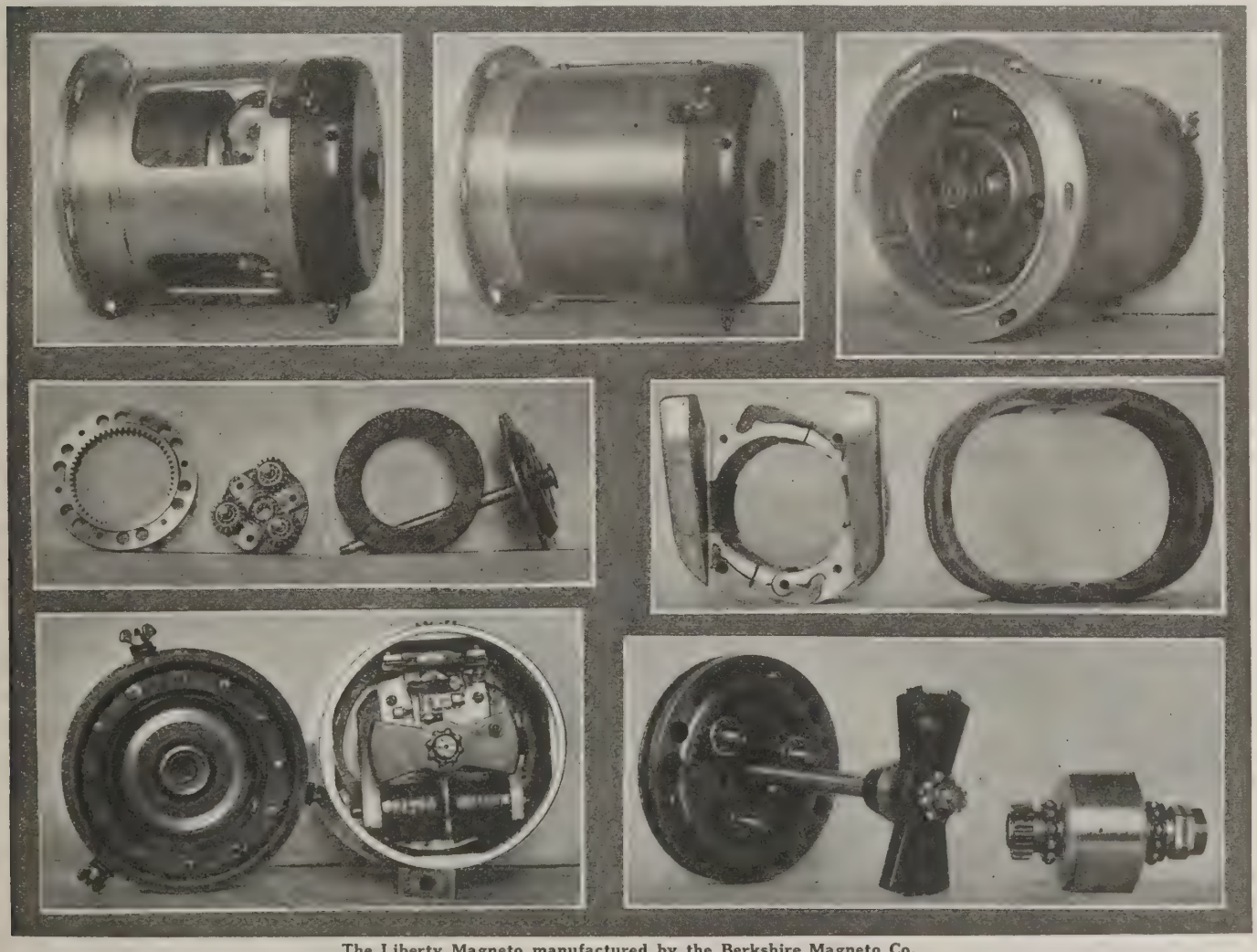
The distributor is of the jump spark type, made of special approved compound with metal inserts and socket type, radial receptacles for the leads from the spark plugs, the terminal binding screws being on the inside of the distributor. This distributor also serves as the end cover of the magneto, and when removed exposes the interrupter, condenser, coil and other vital parts which are thus easily accessible for inspection and repair.

The driving power from the cam shaft of the engine is transmitted to the armature through a flexibly mounted train of gears, consisting of a large bronze annular gear and three steel pinions, which latter engage with a hardened steel pinion on the armature shaft, rotating the armature at three time cam shaft speed.

A central shaft welded to the outer steel disc projects from the cam shaft of the engine, through the train of gears, through the hollow armature shaft, and carries at its outer end the collector ring and distributor rotor, which conducts the high tension current to the proper terminals inside the distributor.

A cover of sheet brass encloses the sides of the frame, and with the distributor on the end form a water and dust proof protection for the working parts of the magneto.

It is expected that magnetos of the Liberty design will soon be available for other aviation and automobile engines of the "V" type, and since they provide not only a duplicate source of ignition, but simplify the problem of driving connections, as they will be available in both the horizontal and vertical type, should strongly commend themselves to the engine builders, who have been searching for a dependable magneto with these characteristics.



The Liberty Magneto manufactured by the Berkshire Magneto Co.

THE O. E. C. TYPE B SINGLE SEATER

ALTHOUGH the Model "B" and "C" Machines were the first single seater types produced by the Ordnance Engineering Corporation of Baldwin, L. I., and the Model "B" the first single seater to be actually built in the United States and fitted with a 160 H.P. Gnome, it is gratifying to learn that at its first trial it not only equalled but surpassed the performances of the best of the then existing foreign planes. The Model "B" is a single seater fighter designed to carry a full battery of Revelli guns, mounted on the wings or one synchronized machine gun, fixed and firing through the propeller.

After the cancellation of the order for 160 H.P. Gnome engines in this country, the Model "B" machines were modified to take the 80 H.P. Le Rhone motors, and it is interesting to note from the official records made in the trials at Dayton, Ohio, that this machine with one half the horse power it was originally designed for not only equalled but surpassed the performances of other designs equipped with a like motor.

In addition to the splendid flight performances put up by both types, an equally fine record was made with sand tests at Dayton, Ohio. The wings went to a factor of safety of 8½, showing one of the strongest wing trusses ever tested at that plant, weight and size considered. The elevators and tail parts failed under a load of 67 lbs. per square foot. Specifications called for a breaking load of 35 lbs. per square foot.

During a test at the company's experimental shop a total load of 8,400 lbs. was applied to the wings and left on the wings for sixteen hours.

As stated before, the type "C" is an adaptation of the Model "B" fighter, and with the exception that the staggers differ in the two types and the tanks and weight distributions are different, the general dimensions of the two types remain the same.

General Dimensions

Span, upper plane	26′ 0″
Span, lower plane	23′ 0″
Chord, upper plane	4′ 0″
Chord, lower plane	3′ 9″
Gap, between planes	3′ 8″
Overall length	19′ 0″
Overall height (propeller horizontal)	7′ 7″
Stagger	7″

Areas

	(*sq. ft.*)
Upper plane	102.2
Lower plane	77.8
Ailerons, upper plane	17.9
Total wing area (with ailerons)	180.
Stabilizer	12.2
Elevators	12.
Fin	3.08
Rudder	5.4

Weights

	(*Pounds*) Model B	Model C
Total weight, full load	1,290.	1,090
Weight per sq. ft. of Area	7.15	6.05
Weight, pounds per H.P.	8.07	13.62

Weights, useful Load—Model C

Fuselage	165
Chassis	77
Tail Group	23
Engine	280
Propeller	23
Tanks	30
Wings	150
Total	748

Weights, useful load—Model C

Gasoline	126
Oil	20
Pilot	180
Fire Extinguisher, etc	16
Total	342

Weight Distribution

	(% of totals) Model B	Model C
Structural Weight	33.	34.4
Power Plant	28.3	34.79
Fuel and Oil	15.5	12.65
Military or Useful Load	23.2	18.16

Performances

(Climb)

Altitude (*feet*)	Time (*minutes*) Model B	Model C
5,000	3.2	8
10,000	6.6	17
15,000	16.	40
20,000	26.5	..
Ceiling	42.	55



Rear view of the O. E. C. Type B Gnome Engine Scout

(Speed)

Altitude (*feet*)	(Miles per Hour) Model B	Model C
0	136	104
5,000	...	101
10,000	...	96
15,000	...	90
20,000	...	83
Ceiling	...	72
Stalling Speed	51	33

(Duration)

Maximum range, at 10,000 feet

	Model B	Model C
At full power	...	2¼ hours
At minimum power	...	3 hours

Main Planes

Aspect ratio of upper wings, 6.5; lower wing, 6.14.

Safety factor of wing truss at high speed, 6; at low speed, 7. Wings have no sweepback nor dihedral. Decalage, 1 degree. Angle of upper wing to propeller axis, 1.5°; lower wing, 0.5°.

Gap to chord ratio, 0.947.

Wing section, R. A. F. Number 15.

Clear vision is obtained forward through an angle of 45 degrees between wings. The only blind spots are through an angle of 8 degrees for the top wing and 33 degrees for bottom wing.

Ailerons are 6′ 9″ long and 1′ 7″ deep. Center of pressure, 9′ 6¾″ to longitudinal axis.

Tail Group

Stabilizer span, 7′ 6″; depth, 1′ 10″. Center of pressure to center of gravity of machine, 11′ 10″.

Elevators are 8′ 2″ in span; depth, 2′ 0″. Center of pressure to center of gravity of machine, 13′ 4″.

Rudder, 3′ 4″ high and 2′ 0″ deep. Center of pressure to center of gravity of machine, 13′ 4″.

Fin, 1′ 8″ high, 2′ 10″ deep. Center of pressure to center of gravity of machine, 11′ 9″.

Landing Chassis

Wheels have a track of 5′ 0″. Angle of center of gravity ground point and vertical 13½ degrees.

Chassis designed to stand up when fully loaded machine is dropped from a height of 10 inches.

Fuselage

Length of fuselage, 15′ 11″. Maximum section, 3′ 5″ by 3′ 5″.

Fuselage designed to stand a load of 30 pounds per sq. ft. on horizontal tail surface and dynamic loading of 5. Engine section has a safety factor of 10.

The instruments on the dashboard are as follows: Dixie Magneto switch; Phinney-Walker rim wind clock; longitudinal inclinometer; horizontal inclinometer; Altimeter (20,000 ft.); Tachometer, Signal Corps, type B; and a Sperry Air Speed Indicator. The clock, Altimeter, Tachometer, and Air Speed Indicator have Radiolite dials.

A Pyrene fire extinguisher is conveniently mounted at the left of the seat, connected so as to be pumped directly into carburetor, or it may be used separately.

Power Plant

(*LE RHONE*)

The 80 H.P. Le Rhone engine develops its rated H.P. at 1,200 r.p.m. Fuel tanks are mounted between the engine and the pilot, over the center of gravity.

Capacity of gasoline tank, 18 gallons, Oil, 4 gallons. Weight of gasoline, 110 lbs., sufficient for 2¼ hours. Weight of oil, 28 lbs., sufficient for 2¾ hours. Gasoline consumption, 0.60 pounds per B.H.P. hour. Oil, 0.13 pounds.

Propeller, 8′ 4½″ diameter and 7′ 6½″ in pitch.

Height of propeller axis above ground with machine in flying position, 4′ 11″; with machine at rest, 5′ 6″.

Power Plant

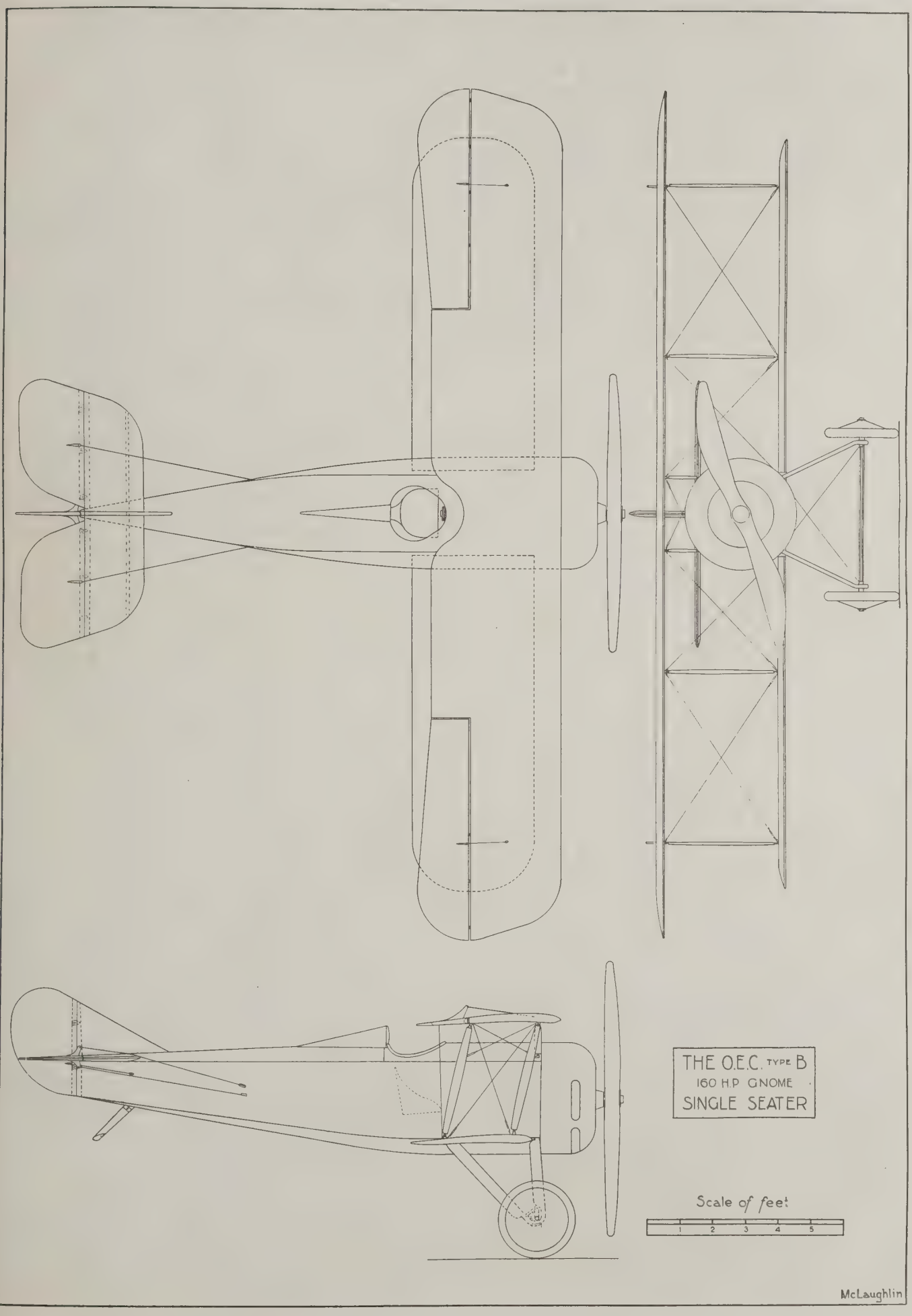
(*GNOME*)

The Gnome engine is of French manufacture. At 1,200 r.p.m. it is rated at 160 H.P.

Gasoline consumption, .85 pounds per H.P. per hour; Oil, 16 pounds per H.P. per hour; Gasoline capacity, 35 gallons; weight 210 pounds. Oil capacity, 4 gallons; weight, 28 pounds.



Three-quarter front view of the Ordnance Engineering Corporation's Scout


THE O.E.C. TYPE B
160 H.P GNOME
SINGLE SEATER
Scale of feet
1 2 3 4 5
McLaughlin

THE LAWRANCE 60 H.P. AIR COOLED ENGINE

THE Lawrance Model L-1 is a three-cylinder Y-type air-cooled engine rated at 60 h.p. at 1,900 r.p.m. The accompanying graph shows that the engine delivers 30 h.p. at 800 r.p.m. and 63 h.p. at 2,100 r.p.m.

Bore, 4.25 inches; stroke, 5.25 inches. Cylinder displacement, 225 cubic inches. The weight complete with propeller hub, 130 pounds. This weight includes everything necessary for running, with the exception of the oil tank and mounting plates for which an additional weight of nine pounds is allowed. Starting handle is supplied when desired. Exhaust pipes made to individual requirements.

Cylinders

The cylinders are of cast aluminum with cooling fins machined. Shelby steel liners with walls 1/16 inch thick are cylinder and the crankcase. Liners are case-hardened and ground, which gives them a very fine wearing surface.

Each cylinder is attached to the crankcase by means of six studs.

Pistons

Pistons are of cast aluminium alloy. Crowns are flat. Each piston has four concentric cast iron rings and one wiper ring on skirt.

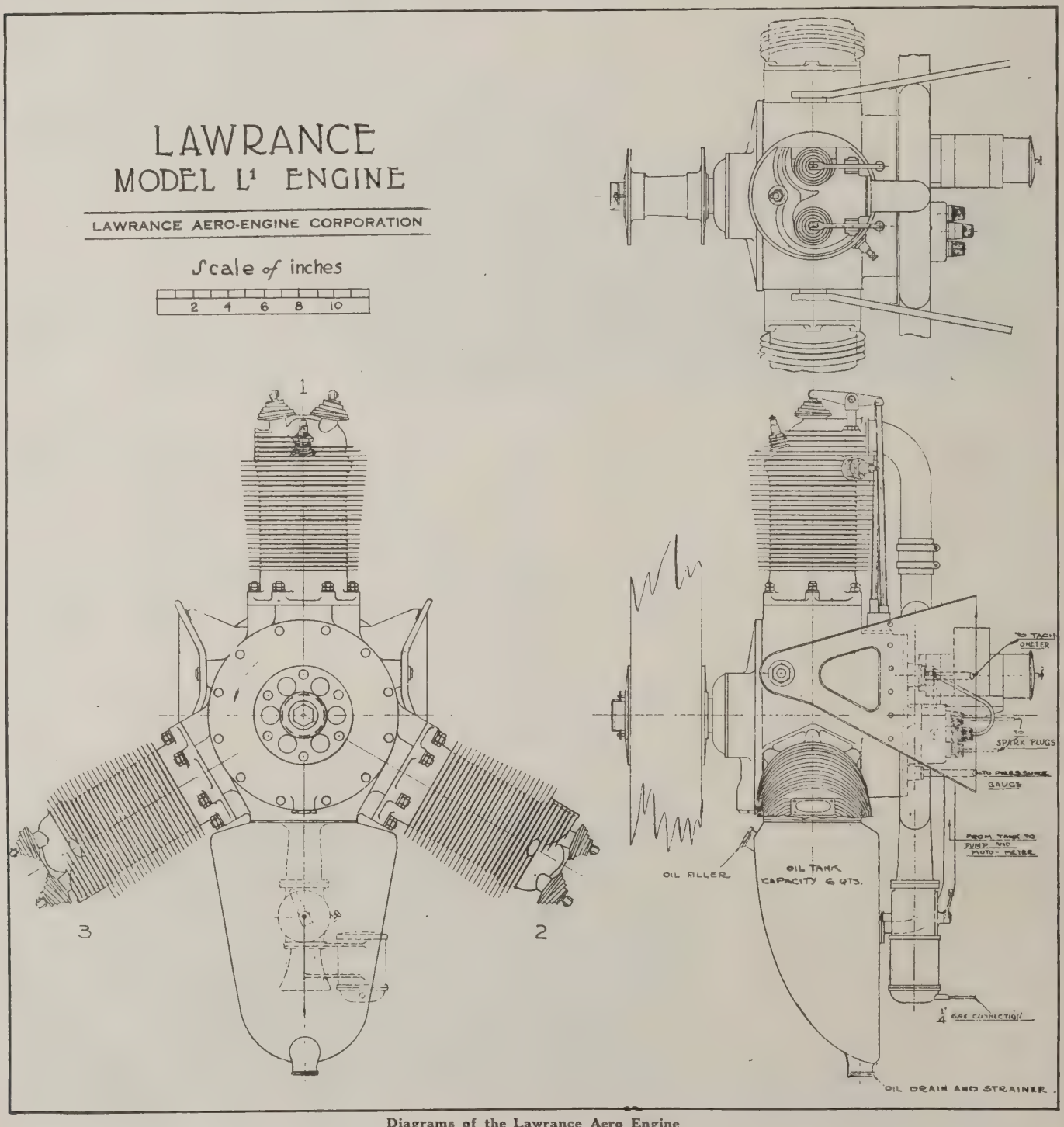
Crankcase

Crankshaft is of chrome nickel-steel. It has a single throw and is counterbalanced. The shaft is hollow for lubrication.

Front end of shaft is tapered to receive the propeller hub which is drawn tight by means of a differential thread nut. The shaft is sturdy and of large dimensions throughout.

Connecting Rods

Connecting rods are of chrome nickel-steel. They are round, of constant section and hollowed for lightness. They are machined all over. Each of the three rods has a seg-



Diagrams of the Lawrance Aero Engine

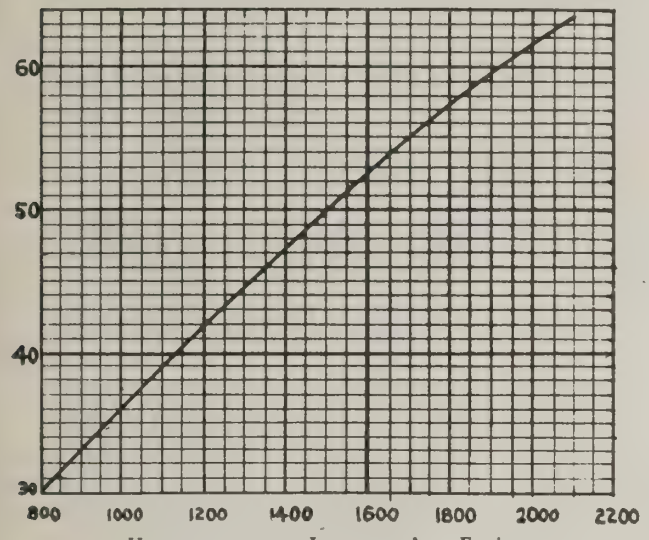
mental shoe which floats in two grooves in the big end bearing.

Bearings are of cast bronze with Babbitt lining.

Wrist pins of nickel-steel float in both the rods and pistons. Bronze buttons on the ends of wrist pins keep them from working out sidewise.

Valve Gear

Valve gear consists of three individual camshafts, each with two cams. The push rods are adjustable.



Horsepower curve, Lawrance Aero Engine

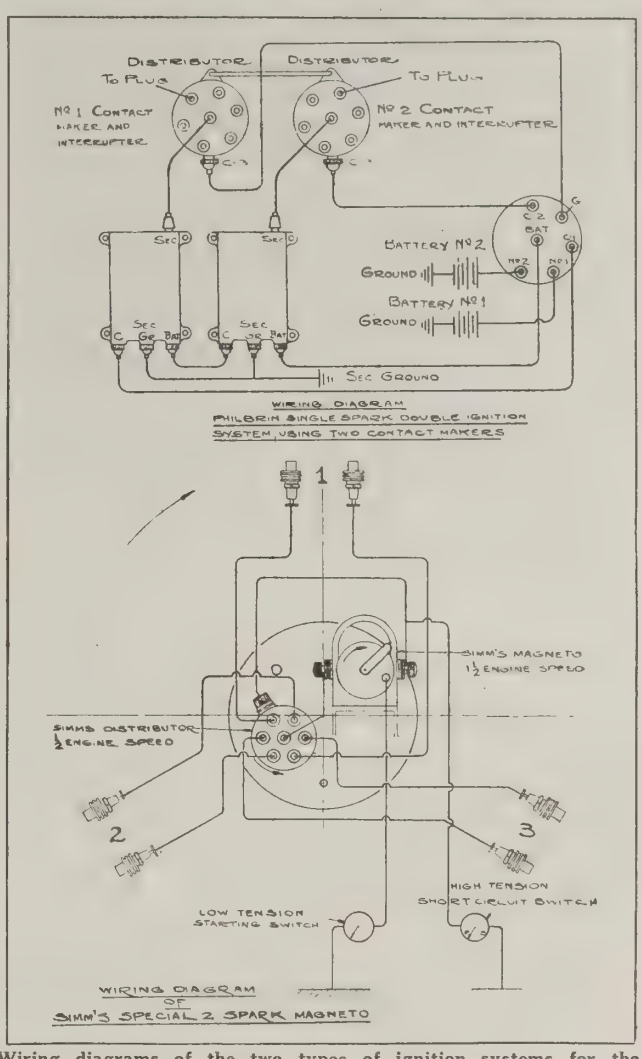
Rocker arms are provided with rollers where they come in contact with the valves so that all side thrust on the valve guides is eliminated.

Valves are of Tungsten steel, 2 1/16 inches in diameter.

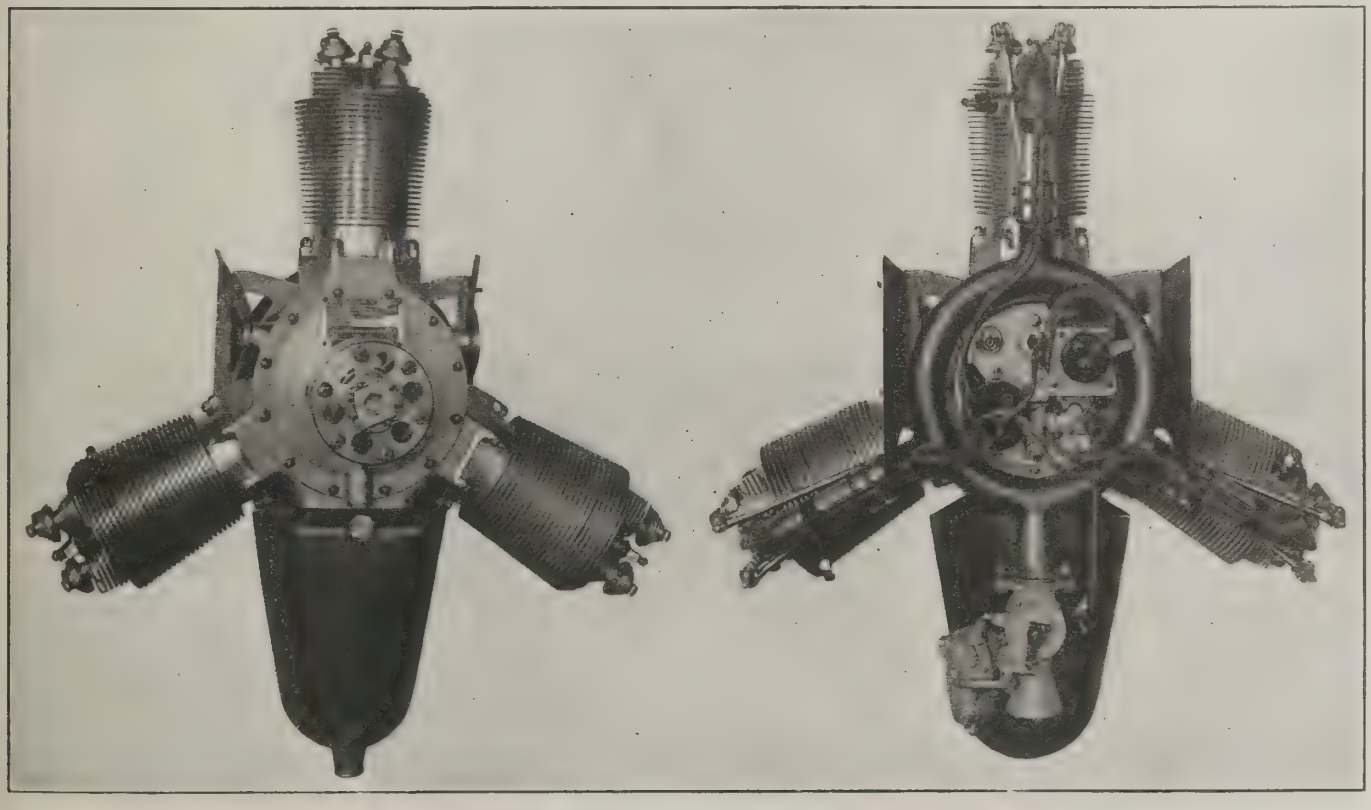
Exhause valves are mercury treated so as to more readily conduct the heat from the head of valve to the stem.

Guides and valve seats are also of cast bronze, set into heads of the aluminium cylinders.

Springs are of a new type. They are conical in shape,



Wiring diagrams of the two types of ignition systems for the Lawrance Model L-1 Aero Engine



The Lawrance 60 H.P. air cooled aero engine

wound of flat steel placed edgewise and tapered so that the greater width is in the large coils and lesser width in smaller coils. This permits of a shorter spring than would be possible with the usual helical coil spring.

Ignition

Two kinds of ignition are supplied. One type is a magneto designed by Mr. Kilsrath of the Simms Magneto Company which has a single breaker and one primary winding but two high tension windings, giving two absolutely synchronized sparks.

Magneto is run at 1½ times engine speed. The high tension distributor is separate and driven off one of the crankshafts.

The other ignition system is the "Philbrin," designed by the Philips-Brints Ignition Company. This system has a dual spark with two breakers; either one is used to fire the entire system; allowing perfect synchronization.

One of the accompanying illustrations shows the magneto in place.

Carburetor

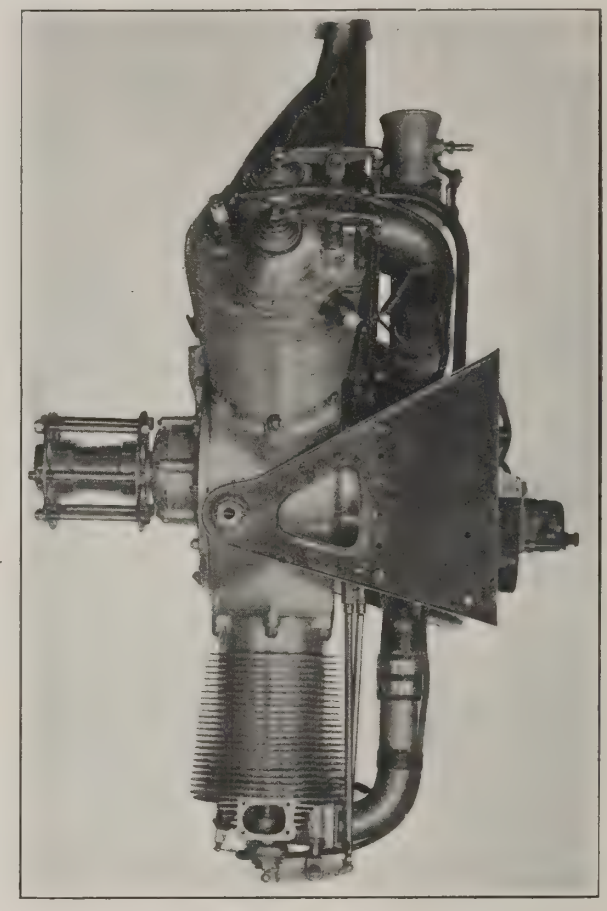
A Miller Carburetor is used. It has a throat 1¾ inches in diameter.

Lubrication

Lubrication is by means of pressure supplied by a gear pump. Pressure is maintained at 25 pounds per square inch.

The oil is fed through the rear of crankshaft to the front cover where it runs to a check valve which maintains the necessary pressure. From this valve the oil drains back to the tank immediately below it. On the front cover plate, the by-pass valve operates at a pressure of 50 pounds. It might seem that the two lower cylinders would obtain most of the oil but as a matter of fact it has been proven that the oil is evenly distributed to the 3 cylinders.

Oil is consumed at the rate of .07 lbs. per h.p. per hour.



BOEING SEAPLANE—TYPE C-1-F

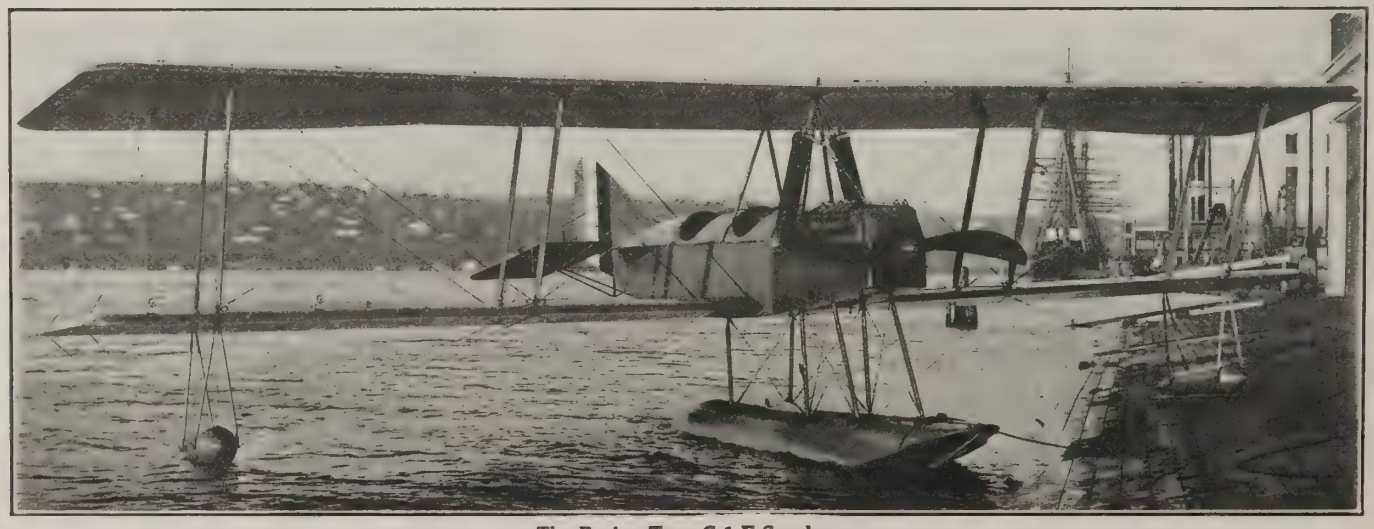
THE model C-1-F is an advanced modification of the Boeing type "C" seaplane used by the Navy Department for training purposes during the war. This machine embodies the use of the single float and the Curtiss OXX-2 eight-cylinder motor. A further modification from the "C" type lies in the use of one degree of dihedral rather than 2¾ degrees as used on the older machine.

Wing Structure

The wing structure follows the model "C" in that a 50 per cent. stagger and 2½ degree declage is used. This combination assures the inherent longitudinal stability which has been characteristic of previous Boeing designs. The center cabane struts are made of seamless steel tubing with special steel terminals, giving a simple, efficient and sturdy center section construction. The forward construction of the cabane eliminates fore and aft stays and furnishes substantial means of bracing the side radiators. The interplane spruce struts are of straight streamline form, tapered at the ends to accommodate strut sockets, while the internal drift struts are made from web sections, of box form. The wing fittings are of special design, giving a minimum of head resistance, while providing for maximum strength necessary. The wing tip floats are provided, these being of conventional form and securely braced to the lower wings.

Tail Unit

The design of this unit is characterized by extreme simplicity as well as maximum strength. Balanced elevators are used, giving automatic adjustment for differences in loading. This



The Boeing Type C-1-F Seaplane

feature is particularly notable to pilots in that maximum and minimum conditions in the distribution of the useful load are unnoticed in flight. The elevators are fixed to steel shaft, having center and two end bearings for supports. Fin and tail posts are of steel, making a thoroughly satisfactory mounting for bracing and tubes.

Landing Gear

The landing gear is of conventional single float type. The underwater lines of this float are such as to assure quick getaway and easy landing without undesirable spray and water disturbances. The stability of this machine has frequently been demonstrated while taking off, landing and taxying in rough seas and while drifting in as high as 30-mile winds. The float is of two-ply laminated construction and with cotton and marine glue between the laminations. The external float fittings are such as to facilitate rapid assembly as well as to transmit all stresses to the center longitudinal bulkhead, which is the main strength member of the float. The landing struts are of streamline steel tubing.

Body

The body is of the conventional longeron truss type with metal frames for engine bearers and metal carry through struts for lower wings. The seats are made from a series of ash slats conforming to the attitude of the occupant and covered with detachable upholstery. The cushions are stuffed with Kapoc and are readily detachable for use as life preservers in emergency. The instrument board is equipped with all instruments necessary to indicate the operation of the machine. The surface control is Dual Deperdussen, featuring an adjustable rudder and adjustable rudder compensator for distance service. The engine throttle is mounted at the right of both cockpits, and the ignition retard is at the left of the pilot's cockpit. The Curtiss OXX-2 100 H.P. motor has proven extremely satisfactory. It is light, powerful, economical and free from undesirable vibration in the range of flying operation. A hand starting lever is provided immediately behind the motor and has given satisfactory service. As mentioned before, the cooling system is mounted to the rear and above the motor. This mounting is exceptionally effective and has performed satisfactorily in service. The gasoline tank is immediately behind the motor and supplies gasoline under atmospheric pressure to the carburetor. The carburetor lead is supplied with a shut-off valve operated from either cockpit as well as a convenient drain beneath the body.

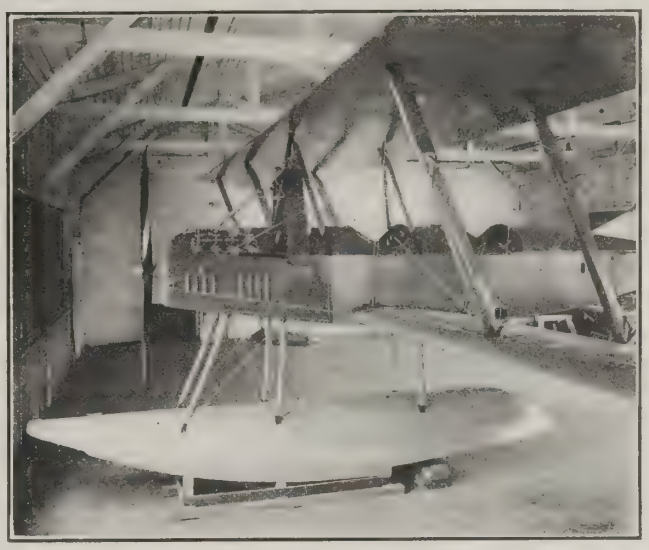
Performance

1. *Power Plant—*

Curtiss OXX-2	100 H.P.

2. *Wing and Control Surface Areas—*

Main Planes (including Ailerons)	493 sq. ft.
Upper Planes (including Ailerons)	264 sq. ft.
Lower Planes	229 sq. ft.
Ailerons	36 sq. ft.
Number of Ailerons	2
Elevators	30 sq. ft.
Rudder	12 sq. ft.
Vertical Fin	6 sq. ft.



The Boeing Type C-1-F. Seaplane

3. *Overall Dimensions—*

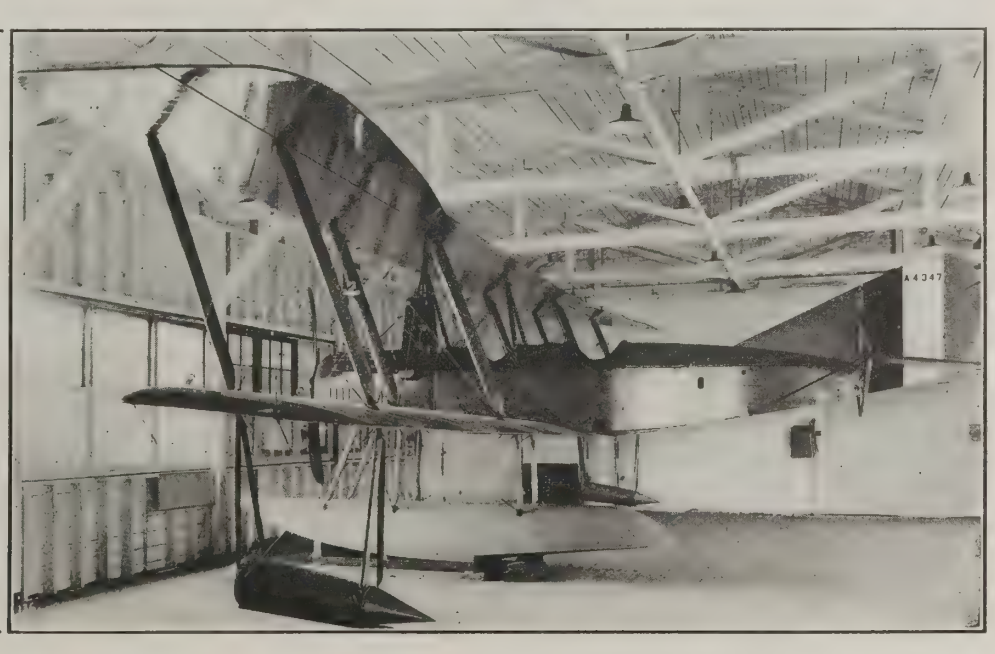
Span Upper Wing	42′ 11½″
Span Lower Wing	42′ 11½″
Chord Upper and Lower Wing	69″
Gap	72″
Length over all	27′ 0″
Height over all	12′ 11½″
Dihedral	1°
Stagger	29½″
Incidence of upper wings	6½°
Incidence of lower wings	4°

4. *Performance—*

Climb in 10 minutes (full load)	1800 Feet
High speed	70 M.P.H.
Landing speed	38 M.P.H.
Endurance at full speed	2½ hours

5. *Weight—*

Loaded	2445 lbs.



The Boeing Type C-1-F. Seaplane with Curtiss OXX-2 motor

THE CAPRONI BOMBING TRIPLANE TYPE CA-4—1915

THE Caproni triplane, which was on exhibition at the Aeronautical Exposition at the Sixty-ninth Regiment Armory, represents a type designed and built by the famous Italian constructor since 1915. This machine was created at that time for the night bombing of important military and naval bases, railroad stations and war plants.

As for the preceding types of machines by the same constructor which have attained fame for the brilliant services rendered to the Allies the type Ca.4 triplane has for its distinctive characteristic the number and arrangement of the motors, firstly adopted by the renowned Italian constructor. There are three motors, distributed on the two fuselages and on the central nacelle. The central motor is for a pusher propeller, while the two lateral motors have each a tractor. Both tractors turn in the same direction.

Fuselages and nacelle are attached to the spars of the middle wing. The center wing section, lower plane, holds the bomb rack. This bomb-dropping apparatus, also devised by Engineer Caproni, represents the simplest, most reliable and the lightest in weight of all the devices brought forth for bombing purposes during the war.

Normally the crew of the machine is constituted by two pilots, seated side by side, as it is usual with the Caproni bombing planes, a gunner in the front nacelle cock-pit, who operates a 1½-inch gun and two Fiat machine guns, coupled on the same mount. The front gunner also operates a searchlight of the Sautter-Harlé type. The rear defence is enthusted to two gunners, each of whom is seated in one of the fuselages; they also handle Fiat machine guns coupled on the same mount.

Each of the five men is afforded the possibility of commodiously transferring himself from one part of the machine to another. Between the central nacelle and the fuselages on the middle wing a passage covered with veneer wood is installed for this purpose.

The bomb sight and the five handles controlling the bomb rack are operated by the pilot on the right-hand seat.

The Ca.4 triplane has been successively equipped with three different types of motors. At first three Isotta-Fraschini 8-cylinder (vertical) 240/250 H.P. engines were used; it was later equipped with three Fiat A/12-Bis 6-cylinder (vertical) engines, and finally three Liberty-12 engines, Navy type (low compression) were adopted.

With an aggregated useful military load of 6,600 lbs. the performance of this triplane, equipped with Liberty engines, have been, especially in climbing, considerably better than those obtained with the other two types of motors. In the official tests, at full load and fully armed, a speed of 98 M.P.H., registered at 6,560 feet, was reached. The average rates of climbing attained with Liberty motors at full military loads were:

3,280 feet in 6 minutes
6,560 feet in 14 minutes
10,000 feet in 25 minutes

The ceiling is at about 16,000 feet.

The total weight of the machine, empty, is 11,100 lbs. With full military load the machine weighs 17,700 lbs.

With a complete fuel load of 550 gallons, the bomb rack is supposed to be loaded with 2,500 lbs. of bombs, but practically in almost all bombing raids the load of bombs exceeded 3,000 lbs.

The following is a table of the general specifications.

General Dimensions

Overall wing span (at trailing edge)	96′ 6″
Overall height to top of aileron, lever in normal position	20′ 8″
Overall length	42′ 11″
Chord	6′ 11¾″
Gap	7′ 13½″
Gap ÷ Chord	1.004

Areas

	Each Section (*sq. ft.*)	Total (*sq. ft.*)
Upper, middle and lower center section	38.413	115.240
Upper, middle and lower inner intermediate section.	91.589	549.534
Upper, middle and lower outer intermediate section.	91.589	549.534
Upper, middle and lower outer section	130.282	781.692
Aileron area	37.810	226.863
Total area		2,222.863
Rudder	26.943	80.829
Stabilizer	.....	109,752
Elevator	.....	81.614

Detailed Dimensions

Upper, middle and lower center section length	5′ 6 3/64″
Upper, middle and lower inner intermediate section length	13′ 1 7/16″
Upper, middle and lower outer intermediate section length	13′ 1 7/16″
Upper, middle and lower outer section length	18′ 3 1/32″
Aileron length	19′ 7⅛″ / 19′ 4 13/16″
Stabilizer length	34′ 1 11/32″
Stabilizer breadth	3′ 1 25/32″
Elevator length	35′ 7 1/16″ / 36′ 3 11/16″
Elevator breadth	1′ 1⅝″
Front strut height (average)	7′ 3 3/16″
Rear strut height (average)	7′ 8 17/32″

Angles

Lower wing chord	8° 50′
Stabilizer chord—minimum	3°
Stabilizer chord—maximum	8°
Motor inclination	2°
Stagger	0°
Sweepback	0°
Dihedral	0°

Main Planes

Each of the three planes is built up in seven wing sections. The corresponding sections in upper, middle and lower wings are equal in length. The wing spars are of box beam section. The ribs, double ribs and box ribs are in whitewood and ash (cap-strip). Between rib and rib the wing spars are wrapped with strong linen. The connection between the two subsequent sections is obtained with the male and female box-fitting system.

The chord is, for the entire length of the wings, 6′ 11¾″. The covering is of linen, nailed on the rib cap-strips and on the leading and trailing edges. On the linen, above and below the wing, maple batten strips are screwed in correspondence to the ribs.

For the interplane struts, ash, spruce and seamless steel tubes are used. Some of the struts have adjustable ends. The bracing is, as usual, with steel cables and wires.

Gasoline System

The gasoline is supplied by three tanks disposed; two, one in each of the fuselages and one in the nacelle. Three wind-driven centrifugal pumps pump the gasoline from the tanks to a central distributor, and from this to the carburetors of the three motors. The pilots have close at hand the devices necessary for the regulation of the gasoline pressure. For the testing of the motors on the ground two small gravity tanks are provided; these are excluded from the circuit while the machine is in flight. Each of the three tanks is divided in three compartments, and at the bottom of each of said compartments a check valve is applied, this valve working so as to avoid that in the event one of the compart-



The Type CA-4 Caproni Bombing Triplane, capable of carrying a useful load of 6,600 lbs.

ments is shelled the gasoline in the undamaged compartments should leak through the hole bored in the damaged one.

Chassis

The landing gear is of a special Caproni design and very robust. The two M-struts are of laminated ash and spruce, wrapped with strong canvas fabric. The chassis carries on each side one front and one rear axle; these axles are attached to the chassis by means of shock absorber rubber cord and rods fastened at the other end in a universal joint, so as to absorb whatever oscillation the machine may make in taxing or landing. Each of the front axles carries two double wheels, one on each side of the M-strut. The chassis is braced in the usual manner with double steel cables.

Nacelle

The nacelle is perfectly streamlined (dirigible form). Two main longerons with compression steel tube struts between them and diagonal steel brace wire and cables form the frame on which a set of ribs of appropriate design are fastened. The outer edge of the ribs determine the shape of the nacelle. Birch veneer and walnut are employed in the construction of these ribs, said construction being of a somewhat likewise manner to that employed for similar elements of flying-boats. The front of the nacelle, upper part, is formed by a cowling made of plywood with interposed layers of fabric.

The two pilots are seated back of the front gunner. Behind they have a gasoline tank, and before them a large dashboard for the instruments, while between them they have a board for the controls (gas, spark and altitude adjustage) for the three engines. The gasoline system is controlled by various cocks and a special distributor, all disposed in such a manner as to render them easily accessible to either of pilots. In the rear of the gas tank, which is of the same circular section that the nacelle has in that tract, there is a short path that allows the motorist to freely accede to the rear motor. The engine bed is conveniently braced with adjustable steel tubes and steel braces. The rear part of the nacelle around the engine is also cowled. For the remaining parts linen and veneer are used.

Fuselages

The fuselages are flat-sided and of the usual construction with four ash longerons, and between them compression struts, steel cables and wire bracing. All the fittings, to which the diagonals are fastened, can be manufactured with the one and the same set of dies. They are of a model, extremely simple and light in weight, without welding or bracing, and applies so as to avoid the longerons' being bored by bolts or screws. The front end of the fuselage around the motor is aluminum cowled. A gas tank is placed in the rear of the motor, and an oil tank under it. At a short distance from the trailing edge of the middle wing a seat for the rear gunner, with the usual arrangement for machine guns and ammunition, is installed. From the height of the gunner seat to the rear end the fuselages are linen covered. A Pensuti tail skid with shock absorber is at the end of each fuselage.

Control Surfaces

As on all Caproni bombing planes, the stabilizer, elevator, rudders and ailerons are of steel tubes. The tail surfaces are very ample, as can be observed from the dimension chart heretofore given. The stabilizer is solidly braced to the fuselage by means of cables and steel tube struts. It bears the three characteristic vertical rudders. The ailerons are six in number, one at each of the ends of the three wings.

As also on the other Caproni bombers, dual control is fitted so that the plane can be controlled by either pilot at will. The control system for ailerons and elevator is a combination of the wheel and stick method; the vertical rudders are controlled by a foot bar of the usual type.

For the sake of emergency, the pilot on the left also disposes of a hand pump, sufficient to feed the three motors by pumping from the central tank. Each motor has its own oil tank and a small radiator for the cooling of the oil.

The lateral motors have a nose water radiator, fastened on the same beams forming the engine bed. The central motor has two radiators, high, narrow and streamlined, each placed at the two rear interplane struts between the center wing sections, middle and upper plane. All the radiators are of the honeycomb type, and equipped with shuuters.

Lighting and Heating

The lighting system for navigation, signalling and landing, and the heating system for the crew are few by a wind-driven generator of one kilowatt, combined with a large storage battery.

Instruments

The instruments are all set in a large dashboard before the pilots. Besides the usual standard instruments for navigation, motor and radiator control, each pilot has a Pensuti Air Speed Indicator. Some machines are also equipped with an Absolute Speed Indicator.



Group of Italian, British and American authorities standing in front of a huge Caproni triplane of the type that would make mail carrying from New York to San Francisco possible. Third from left, Lieutenant C. Leopoldo Belloni, R. I. F. C., with a British general at his side. The two civilians in the center are Gionni Caproni, in front, and Dr. Frederico Caproni. Next to them is Captain Guido Laureati, the famous Italian aviator who flew from Turin to London, and from Turin to Naples and back. (Italian Official Photo.) Twelve Capronis of this type have made a long non-stop flight of 1000 miles

THE DEVELOPMENT OF THE TYCOS ALTIMETER

Written Especially for Aerial Age by P. R. JAMESON, F. R. Met. Soc., F. R. G. S.

AT the outbreak of hostilities in Europe in August 1914, the United States was in a most peculiar and difficult position in regard to the procurement of certain articles obtained abroad, as the majority of the European governments had prohibited the exportation of all material which would be of assistance to them in the successful prosecution of the war.

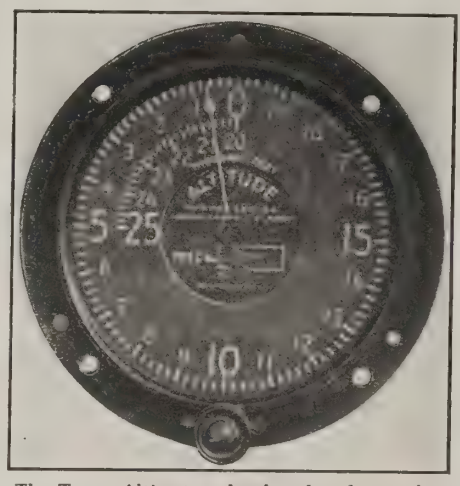
Among these articles were numbered instruments. Certain types were obtainable only in Europe for the English and French manufacturers had supplied the wants of practically the whole world.

The Altimeter was an instrument essential to nearly every aeroplane and where to obtain them became the question of the moment. Early in 1915 the Taylor Instrument Companies were aproached by a certain aircraft manufacturer and were impressed with the necessity of "getting busy" and looking to the requirements of the ever growing industry.

The altimeter mechanism is the same in general construction as the ordinary weather barometer, but the altimeter is so much more carefully made and constructed that the comparison is as sawdust is to gold.

Having operated a factory in England for the manufacture of barometric instruments of highest grade, for a number of years, we were rather reluctant to start in this country. The construction and adjustment is individual, in fact, each part is made and adjusted for each individual instrument. No parts (except the dials and hands) are interchangeable, and the instrument did not seem to fit into regular manufacturing methods in this country. Again, the work called for expert workmen in this particular line, and there were a few only in the entire country since there were no aneroid barometer factories.

We had a fair number of specialists in our Rochester plant and immediately spread a net over the country to gather in all others that we could find. Workmen were advertised for through the representative papers of the principal cities.



The Tycos Altimeter, developed and manufactured by the Taylor Instrument Companies

As the weeks and months progressed, contracts were placed by foreign governments for altimeters, as inspection of our samples proved they were satisfactory and that they passed all tests.

By the time the United States entered the war our altimeter output was a considerable item. The type instrument adopted by both the U. S. Army and Navy was patterned after the one specially designed by our English factory and supplied exclusively to the British Government by them. We were, not unnaturally, approached by the Government for supplies and immediately set about enlarging our plant with the idea of furthering our output which would in future be diverted to home channels.

Some idea of what was accomplished can be gained from the fact that previous to the Declaration of War by the United States, our factory floor space occupied 120,000 square feet. The day the Armistice was signed we covered 244,000 square feet.



Altimeter testing and adjusting department

The floor space devoted to the adjustment of altimeters alone covered 9,712 square feet and production reached the very satisfactory total of over two thousand completed and accepted altimeters a week. All of these instruments went through the required government test and each passed the individual test by government inspectors.

In order to reach this output testing apparatus numbering 152 sets were installed. Each set is capable of containing 10 instruments. Twenty-five standard mercury barometers used for purposes of comparison were also installed, each of these being standardized by mercury instruments, adjusted and rated by the Bureau of Standards, Washington.

For the manufacture of the altimeter, special metals as regards composition has to be made, rolled and properly prepared before being made into diaphragms. It is most necessary that this part of the instrument be perfect, for it is the heart of the altimeter, and a large percentage of trouble in imperfect instruments can be directly traced to the diaphragm. The thickness of this metal is approximately 0.006 inches, so it can easily be seen that great care and skill is necessary in making and treating it.

A perfect spring opens and closes this diaphragm, dependent on the different pressure changes. It must be perfectly tempered to ensure the diaphragm opening and closing accurately and without any lagging or stiction. The spring, when fitted properly to the diaphragm becomes the main working part of the instrument, since its movement is transmitted to the dial by a series of levers which are very accurately set and which magnify the slightest change enormously until the final movement is seen by the changing of the position of the hand on the dial.

To offset the effect of temperature changes, a compensation became essential. All altimeters pass through temperature ranges of from minus 10 to plus 40 degrees Centigrade, remaining for a series of hours until they become "saturated." The average instrument goes through nine complete temperature tests before compensation is accurately effected, each test consuming approximately six hours.

After compensating for temperature, the mechanisms are placed in their permanent mounting cases, and the adjustment of the movement started so that the dial indications will be correct. This calls for highly trained and skilled mechanical knowledge of the construction and pecularities of each instrument. A test is started by exhausting the air from a large glass covered bowl in which ten instruments are placed. The exhaust takes place at the rate of four minutes for each thousand feet. The readings are noted in comparison with the standard mercurial barometer and corrections tabulated on an individual test sheet. Another "thousand feet" of air is exhausted and the dial readings noted and corrections are tabulated again, and so the test is continued throughout the scale which occupies on the average one and three-quarters hours.

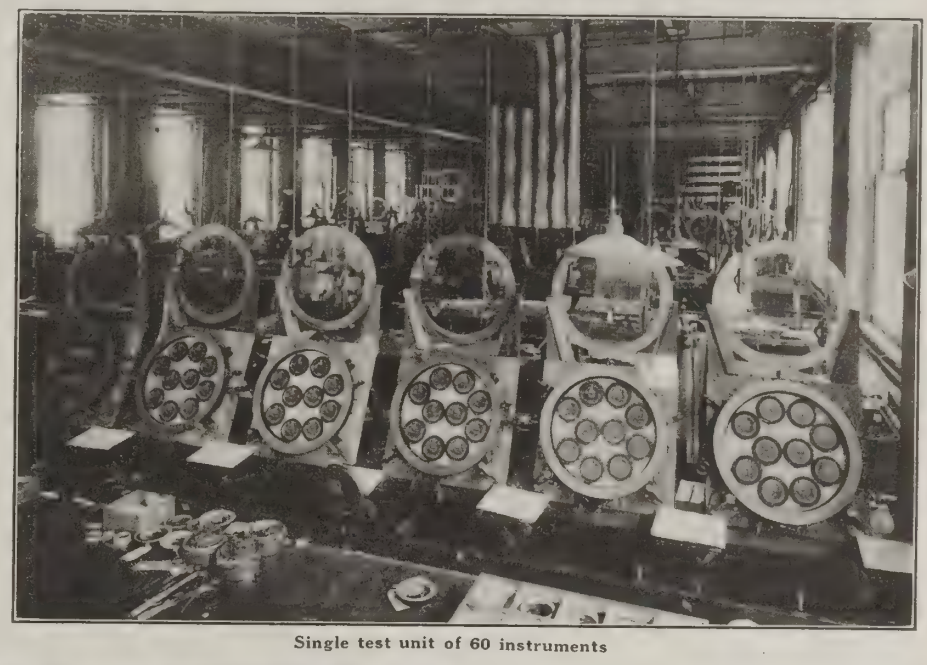
No instruments are correct on the first test for it is conducted solely to see their behavior and to note their errors. After each test a rest of half a day for each instrument is necessary in order to allow its parts to become normally readjusted.

Mechanical changes are then made and another test conducted and errors noted. Our records show that the average instrument is tested twelve times before being finally passed, total test occupying on the average 21 hours with a total rest period of a working week. This is exclusive of the time consumed in compensation.

Friction is a great source of error and as a consequence all bearing have to be very finely polished. Attention has to be given to the correct adjustment and perfect centering of all parts.

At one time it appeared as if production would stop entirely on account of the lack of the very small chains used to transmit the movement to the hand. These chains are all of European manufacture and great difficulty was being encountered in getting sufficient for our needs from our London factory. After considerable experimenting we succeeded in producing some ourselves in small quantities, but the day was saved when our foreign representative successfully procured enough for a further ninety thousand instruments.

Besides being used on altimeters these chains perform the same vital service on the barometers we were making at the rate of twelve hundred weekly for the U. S. Navy and the U. S. Shipping Board. A successful attempt was made by us to supply similar instruments for the war needs of some Allied countries. Each instrument necessitated the use of a chain.



Single test unit of 60 instruments

All completed altimeters were given to government inspectors to enable them to conduct separate tests and select those instruments which came up to specifications in every way. The instruments selected were then stored for a period of three weeks and at the end of that time another and final test was conducted by the government to ascertain if any changes had taken place due to settlement of parts, corrosion by moisture, porosity of diaphragms, etc. Accepted instruments were then ready for shipments to the various depots and plane manufacturers.

We may well feel proud of our attainments for the almost impossible has been successfully accomplished and except for a very negligible quantity the Tycos altimeter has been fitted to every U. S. machine, both for Army and Navy.

Flying high above the clouds, the Tycos altimeter has helped by doing its bit to make the world a better place to live in.



High temperature test for compensation

The French Aerial Post

There were two reasons why the French authorized the inauguration, during war time, of an aerial post from St. Nazaire-Paris—the first, necessity, due to the inefficiency and slow transport of mail on the Western Line, the second, to obtain data upon which to make a report on the subject of aerial postal connection generally. This report has been made to the Minister of Commerce, and is now receiving his attention.

The report states that military aviation can help greatly and immediately by lending or giving aeroplanes, engines, spare parts, hangars and national factories as repair shops to the postal department; the Department of Posts and Telegraphs will recruit their own personnel. The report says that immediately the service is a working proposition 500 pilots will be employed; these aviators must be selected for their intelligence, integrity and soundness. They will be able to earn 20,000 francs ($4,000) a year, counting the bonuses they are to receive over a thousand kilometres. Ten years is reckoned to be the longest period over which an aviator can continue to render useful service to the postal authorities.

The report further points out that if he is not extravagant the aviator will be able to retire with 100,000 francs ($20,000) capital and that if he possesses the necessary qualities he may be made a director of one of the lines and so augment his income.

L'Auto has some very interesting suggestions. One, a means of employing wireless telegraphy as well as an aeroplane to deliver a communication, and this is how it will be done. Letters will be sent in duplicate in a specially made envelope, one portion of which will contain the actual letter and in another portion a resumé of the letter in clear or in code. If owing to bad weather or fog the mail does not leave, the two portions will be dispatched, the resumé sent by wireless, the other following by ordinary mail; thus will the destinataire receive the confirmation of the wireless message.

If the mail-carrying aeroplane has an accident en route it will be known immediately, because according to the *Auto* the pilot will be required to send his code number to earth every five minutes. When the allotted time has passed and no message is received from the pilot the operator will report a breakdown and will proceed to send the mail by wireless. This does not seem a very workable plan, the author of the articles does not say whether each machine is to be equipped with two wireless sets in case one refuses to work, because it is conceivable that the wireless might be out of order though the aeroplane reaches its destination safely in accordance with schedule, in which case it would be unnecessary to send the mail by wireless.

As to the financial profit of an aerial mail there would seem to be no doubt. Assuming that a rapid machine carries 100 kilogrammes of postal matter on a distance of 500 kilometers, it has been calculated, proved and verified that the expenses are covered by 20 kilogrammes of postal matter; the 80 per cent. will remain as profit, and can be utilized either as letters or small registered packets.

The French authorities calculated that on letters weighing under 20 grammes the following charge will be necessary:

500 kilometers ..... 0 franc 75 cents.
500-800 kilometers ..... 1 franc
Above 800 kilometers... 1 franc 50 cents.

and will increase in direct ratio to weight and distance.

LUBRICATING OIL INVESTIGATION

MR. S. W. STRATTON, the Director of the Bureau of Standards, has requested AERIAL AGE to present to its readers a program which has been prepared as a guide to the prosecution of a research on lubricating oils, particularly for internal combustion engines.

Study should reveal what the present qualities of lubricating oils made crude petroleum of different bases now are, and if a difference is found to determine why it exists. Whether, on the one hand, it is caused by the presence of undesirable compounds left in by manufacturing processes, or whether these differences are caused by inherent characteristics of certain groups of chemical compounds peculiar to petroleums of different bases.

It is self evident that any study in the hydrocarbon field is confronted with many complications and difficulties. Valuable information is usually not easily or quickly obtained. Such recognized difficulties, however, should not discourage investigation for the reason that the fertility of the field is extremely inviting from the angle of conservation of national resources and that of the possibility of finding results of great commercial importance, to automotive and petroleum industries.

The most careful consideration of it is invited, and constructive criticisms and suggestions are desired from all interested parties. They should be sent to the Director, Bureau of Standards, Washington, D. C.

Following is the program:

General Purpose

The general purpose of this investigation is to collect as much information as possible pertaining to the many problems involved in the lubrication of internal combustion engines. The majority of these problems have been well recognized in the past, but the real importance and the necessity for their solution have been further emphasized during the war, especially in aircraft engine and farm tractor engine operation.

The secondary purpose of the investigation is to determine the real value and importance of laboratory methods now used in oil testing and of the significance of the results as an indication of the value of oils in practical service. It is hoped that new tests of value may be developed to supplement those now in use.

It is the earnest desire of the Bureau to secure the whole-hearted cooperation of oil refiners, large and small oil users and other interested parties in this investigation. All suggestions for the improvement of the program and constructive criticisms of same from all sources will be heartily appreciated.

General Statement

So far as present knowledge goes the ideal lubricating oil should possess the followign characteristics:

(a) Maximum reduction of friction.
(b) Minimum amount of wear of rubbing surfaces.
(c) Maximum length of time that oil can be used in service.
(d) Minimum rate and minimum amount of decrease in lubricating efficiency.
(e) Minimum carbonization in combustion chambers.
(f) The greater security against seizure consistent with maximum lubricating efficiency.

It is proposed to determine what oil or oils most nearly approach this ideal.

Some Specific Problem

(1) To determine the cause of reduction of lubricating efficiency, i.e., whether it is due to change in viscosity alone or to the presence of decomposition products in the used oil or to both of these factors.

(2) Does the lubricating efficiency of an oil depend upon any other characteristics than those usually recorded in specifications, such characteristics as, for instance, adhesion, specific heat, thermal-conductivity, "body," etc.?

(3) What relationship exists between the flash and fire points of an oil and its boiling point range?

(4) What predictions may be made of the specific consumption of oil in an engine from the values of the flash, fire and boiling point range? Should the entire boiling point range or any part of the boiling point range of an oil be limited?

(5) What are the relative values of the Conradson carbon residue test and the Waters or other oxidation oven tests as means of predicting the decomposition which will occur in any lubricating oil in service?

(6) Does the presence of emulsifying products in an oil effect its lubricating efficiency in service? What disadvantage in reclamation processes are caused by the use of emulsifiable oils?

(7) Does the presence of colloidal matter such as deflocculated graphite, carbon or carbonaceous matter effect the lubricating efficiencies of oils? What is the relative value of settled unfiltered cylinder stock (which contains colloidal matter as well as solid or semi-solid matter in suspension) compared to the same cylinder stock in the filtered condition when these oils are used for blending with light hydro-carbon oils?

(8) What are suitable oils for use in Gnome or other similar types of rotary engines—castor, mineral blended with castor (using oleic acid as a binder) or mineral blended with other fatty oils?

(9) Is it desirable to blend fatty oils (high or low acidity) with mineral oils and what effect does the presence of fatty oils have upon the decomposition of mineral oils of paraffin and naphthene bases?

(10) To what extent do lubricating oils of paraffin and naphthene base, blended with fatty oils, absorb fuel vapors?

(11) How may it be judged when an oil has reached such a condition that it should be discarded or reclaimed?

(12) How may the appropriate viscosity or other characteristics of an oil for any given engine be determined, giving due consideration to seasonal changes in temperature, wear of engine parts, peculiarities of lubricating systems, etc.?

(13) What are the relative merits in service of lubricating oils manufactured from paraffin and naphthene petroleums?

(14) To what extent does the character of bearing metals in contact and the condition of their surfaces influence lubrication?

Engines and Engine Test Methods

It is proposed to make tests of oils in the following aviation engines:

(1) Liberty Twelve Cylinder.
(2) Liberty Six Cylinder.
(3) Hispano-Suiza 150 Horsepower.
(4) Gnome Rotary.

Mechanical Conditions

Record peculiarities of engine lubricating systems, bearing clearances, specific bearing pressures, compression ratio, type pistons and rings, piston clearance and all other mechanical features of importance. The large bores in the crank shaft should be plugged with aluminum to facilitate removal of oil from system without taking down between test if desired.

Rate of Oil Flow

The oil flow from the pump to bearings will be measured by a venturi. If possible the actual rate of oil flow through all bearings should be determined at the normal R.P.M. of engine by direct measurement.

Running Records

Barometer, Temperature, Inlet Air, Humidity.

Constant	*Variable*
(1) R.P.M. of Engine	(1) Horsepower
(2) Fuel Consumption	(2) Oil Consumption (a) Burned (b) Leakage (c) From breathers (vapor)
(3) Jacket Water Inlet Temp.	(3) Oil Temp. outlet to cooler
(4) Oil, inlet to pump temperature	(4) Oil temp. from crank pin cheeks
(5) Oil pressure.	(5) Water Temp. outlet
	(6) Condensate from breathers (a) Oil (b) Volatile (c) Gas.

Test Periods

It will be necessary to determine whether the same amount of decomposition can be obtained in 1 hour runs as in 5 hour or longer periods. A standard test period will be chosen for all tests.

Special Tests

(1) *Fuel Absorption.* Runs should be made with paraffin base and naphthene base lubricating oils using as fuels (a) dry gasoline vapor, (b) aviation gasoline and (c) average auto gasoline with each oil for the purpose of determining the relative amount of fuel absorbed by each and the character of the compounds absorbed.

(2) *Carbon Deposits.* Runs should be made with (a) paraffin, (b) intermediate and (c) naphthene base lubricating oils and a record made by photographing the piston heads and noting the amount and character of the carbon deposits on the remainder of the explosion chambers.

Standardized Test Fuel

A sufficient quantity of aviation gasoline made from the same refinery distillate should be provided for the completion of all engine tests. Whenever any change is made in fuel, then a standardized lubricating oil should be used to determine whatever variation may occur because of the change in fuel.

Standardized Lubricating Oil

It is highly advisable to standardize some lubricating oil for use during all engine tests to check any variation other than that caused by lubricating oil. A sufficient quantity of this oil should be provided to meet the requirements of all check tests.

Theory of Lubrication

Adhesion

(1) Determination of method or methods of measuring adhesion on the following groups of oils:

(a) Hydro-carbon oils of different bases, and each of different viscosities and volatilities.
(b) Fatty oils—prime lard, "acidless tallow, castor and sperm, also same with different proportions of oleic acid, cotton-seed, etc., also cutting oils.
(c) Blends of hydro-carbon oils and fatty oils, also hydro-carbon and castor blends with oleic acid as a binder.

Study of cutting oils, and the bearing cutting oil properties have on lubrication. Power consumption for cutting operations with and without cutting oils.

Study of Oil Films

1. Behavior of films at constant temperature on plates also on plate with temperature gradient, to determine drainage and rate of spread.

2. Behavior of films on different metals with localized heating.

3. Behavior of films on water, as a possible means of throwing additional light on the present knowledge of oil films as applied to lubrication.

Thermal Properties

Specific Heat, Heat Conductivity and Thermal Expansion on same groups, of oils as given under Adhesion.

Friction Machines

The practical usefulness of friction machines in general has been widely commented upon and questioned in the past. In order to definitely settle the real value of friction machines, the following program of investigation is proposed:

(1) Study of present stage of the art.

(2) The analysis of all existing machines comprising the following general items:

(a) Information is desired as to whether a reading can be made of the critical point of film breakdown, i.e., incipient seizure of bearing at different loads, speeds, and viscosities at the temperature of oil film in the bearings, also when using different bearing metals.

(b) Method of applying lubricant to rubbing surfaces.

(c) Method of regulating all operating conditions.

(d) Recording devices, automatic or otherwise.

In the preparation of the above analysis it is desirable to draft a chart in which as much information as possible may be given in tabular form for direct comparison.

With all the above data at hand, then complete detail specifications should be prepared of an Ideal Friction Machine on which all determinations desirable could be made.

Division VIII, Metallurgy and the Division studying lubricants will fully cooperate with reference to bearing metals and tests.

Routine Tests
Fresh and Used Samples

1. *Gravity.*
2. *Flash.*
3. *Fire.*
4. *Viscosity.* (Saybolt Universal) at 100°, 150°, 212° Fahr.
5. *Color.* 1. Fresh
   2. After Heat Test
   3. Used Oil from Engine.
6. *Emulsion.* Shaker—(Coles).

Demulsibility. Herschel—Stirrer.

Note: Oils more viscous than 50 sec./212° will be blended 50/50 with standardized petroleum ether for shaker emulsion tests.

7. *Cold Test.* A. S. T. M. Method.

Special Laboratory Examinations

Carbon Residue

Carbon residue values will be determined by means of the Conradson Carbon Residue apparatus as described in the A. S. T. M. proceedings. All outside oil samples and special engine test oil samples will be subjected to the Conradson test.

Oxidation Oven

All oil samples both outside and those used in special engine tests will be subjected to tests in both the Waters and Stratford oxidation ovens for the following determinations: (a) evaporation loss, (b) petroleum ether insolubles, (c) "varnish"—resins.

In making a general study of the susceptibility to oxidation of engine oils. full consideration should be given to constitution and methods of manufacture of anhydrous switch and transformer oils. The same remark applies to viscous "water-white" oils, such as Squibbs or Nujol medicinal oils.

Standardized Petroleum Ether

In making petroleum ether insoluble determinations it is imperative that the same standardized petroleum ether be used throughout all tests. Specifications for standardized petroleum ether are as follows:

Gravity, Baumé 77 to 80 (incidental).
Initial Boiling Point. 110° to 120° Fahr.
Final Boiling Point. 220° to 245° Fahr. Unsaturated content not over four per cent (Bureau of Mines Method).

Note: Above distillation range determined by Saybolt distillation method.

Volatility

It is desirable to investigate by distillation the volatility of the different compounds contained in lubricating oils. In order to properly make this investigation, it may be necessary to determine a part of the boiling point range or the whole of that range.

There are four general distillation methods applicable:

(a) Destructive distillation under atmospheric pressure.
(b) Dry distillation under high vacuum (40 to 50 millimeters Hg.).
(c) Distillation under high vacuum (40 to 50 millimeters Hg.) with the introduction of super-heated steam.
(d) Distillation under atmospheric pressure with the introduction of super-heated steam.

It is proposed to determine by experimentation which of the above four methods is most applicable to the study of the constituency of lubricating oils with least decomposition of oil and with the most concordant results.

Other Determinations

(a) Sulphur content, (b) ash, (c) fatty oils, (d) acidity, (e) alkalinity, (f) tarry or suspended matter, (g) moisture, and (h) odor.

List of Oil Samples for Examination

Commercial Oils

A two gallons sample of all available American hydrocarbon oils, intended for the lubrication of internal combustion engines, will be examined for their physical and chemical characteristics. This list of oils will comprise all of those now sold in sealed containers and having reasonable distribution and volume of sales. These oils will not at present be run in the engine tests. It is proposed to purchase these samples at regular intervals, say, quarterly, and to retain a four-ounce sample for reference from each of the samples purchased.

Special Oils

The following Liberty Aero Engine Oil Types will be procured and subjected to a complete examination, including engine tests. Specifications for these oils will correspond to the limits prescribed by Signal Corps Specification Number 3501.

Paraffin Base

(1) Lubricating oil made from paraffin base crude petroleum (Penna.) of high boiling point range.
(2) Lubricating oil made from paraffin base petroleum (Penna) with low boiling point range.

Naphthene Base

(1) Lubricating oil made from naphthene base crude petroleum (Gulf Coast) of high boiling point range.
(2) Lubricating oil made from naphthene base petroleum (Gulf Coast) with low boiling point range.

Fatty Oil Blends

Fatty oil (prime lard) blends will be made with each of the two oils given above under the heading of Paraffin and Naphthene Bases. The physical properties of these blends will be made to correspond to Signal Corps, Liberty Aero Oil Specification, Number 3501.

The above oils have been selected to determine the difference if any in their lubricating efficiencies in service; such differences may occur because of different chemical structure or peculiarities of refining processes applied in their manufacture.

If the data from the tests on this list of oils show marked tendencies it may then also be advisable to carefully investigate lubricating oils made from natural mixtures of paraffin and naphthene base crudes (Mid-Continent) or same made from blends of the lubricating distillates from these two crudes at some stage in their manufacture.

Miscellaneous Oils

Various special oils will be used in the study of the effect of processing methods, i.e., acid treatment, sulpho-compounds, etc. Also the effect of filtration to different colors.

(a) Prime lard, (b) sperm, (c) castor oil—cold pressed, (d) rape seed oil, (e) rape seed oil, blown, (f) cylinder stock—low cold test highly filtered, (g) cylinder stock—strained low cold test unfiltered, (h) "paraffin" and (i) acid treated oils.

Regeneration of Used Oils

It is proposed to make a study of commercial processes applied to the regeneration of used oils and to determine what is the best and cheapest means of converting used oils into good lubricants. Also to determine the relative lubricating efficiency of regenerated oils as compared to that of the same oil in its fresh, unused condition.

Problems Involved

1. Removal of solids in suspension.
2. Separation (distillation) of very volatile products.
3. Separation (distillation) of light oils.
4. Removal of heavy oxidized compounds by treating with soda ash and blowing with steam.
5. Removal of moisture.
6. Filtration—Fullers earth.
7. Blending filtered oil to required viscosity if necessary.

Proposed Samples for Regeneration

1. Used oils made from paraffin crudes—Penna.
2. Used oils made from intermediate crudes—Mid-Continent.
3. Used oils made from naphthene crudes—Texas.
4. Used oils made from California crudes.
5. Used oils made from blends of hydro-carbon and fatty oils.
5. Slop oils consisting of a mixture of oils and greases.

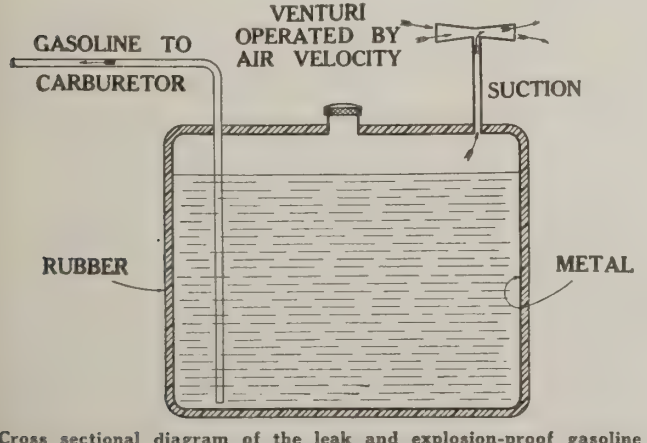
LEAK AND EXPLOSION-PROOF TANKS

THE aeroplane for warfare has been generally thought of as a reconnaissance machine, but the first few weeks of the war demonstrated that it was also of great military value for both offensive and defensive purposes. Machine guns were immediately installed, and aerial warfare became a reality. The combatants quickly realized that the vital spot to be aimed at was not so much the pilot as the gasoline tank, which offered a much larger and easier target to hit. The loss of fuel either forced an untimely and sometimes disastrous landing or the leaking gasoline when mixed with the current of air from the propeller formed a veritable explosive mixture which, when ignited by the engine, set fire to the machine and burned its occupants in midair.

To counteract this, the Germans, having comparatively heavier planes and higher powered engines, soon resorted to armor plating their tanks, while the ingenious French engineers devised compartment fuel tanks, in which one compartment could be pierced and emptied without affecting the others, and the supply to the engine was thus mainained. But war is a game of wits and no sooner had the enemy discovered the French methods than he created and employed incendiary bullets. These bullets owe their inflammability to the presence of phosphorus, which when mixed with the oxygen of the air will ignite any explosive mixture with which it comes in contact.

These bullets were fired within a fraction of a second alternatively with armor piercing and tracer bullets, the order and number of each depending upon the kind of attack that was to be made; but for example we may consider the following order. The tracer bullet, leaving a fine trail of smoke, guided the gunner's aim. The armor piercing bullet put a hole in the gasoline tank, causing the fuel to be spilled and to be ignited by the incendiary projectile which followed. This method of attack was very effective, and the allied casualties increased alarmingly. The compartment tank used by the French airmen was now of no avail, because if one compartment was set on fire the others soon exploded, due to the heat. In the meantime the British had availed themselves of another French invention which consisted in enveloping the gasoline tank with some elastic material. This minimized the tear caused by a striking bullet, but proved only small protection against the incendiary projecile. To get an idea of the vicious character of these bullets, cases have been known where some of the phosphorus became imbedded under the gasoline in the tank, and hours afterward, when the fuel ran low and the phosphorus became exposed to the air, an explosion took place.

This was the state of affairs when the United States entered the war, and the problems were immediately taken up by the Bureau of Standards at Washington. The Bureau in turn took the matter up with a Detroit automobile engineer, Fred Weinberg, who had invented the new leak and explosion proof tank; and it was demonstrated to the Washington authorities in August, 1917, one week after the request was made. The value of the invention was immediately recognized by the Bureau as well as by the Advisory Committee on Aeronautics, who in turn recommended it to the Army and Navy. Through the co-operation of the Bureau of Standards and the Science and Research Division of the War Department the invention was soon brought to a state of high perfection.



Cross sectional diagram of the leak and explosion-proof gasoline tank

The construction of the Weinberg tank is clearly illustrated in the diagram. Primarily it is an ordinary metal tank of any size or shape, having two connections and its filler cap. The suction connection is to provide a partial vacuum above the liquid sufficient to prevent its escape against the pressure of atmosphere on the exterior. This can be accomplished in a number of ways, but the simplest method is undoubtedly by means of a venturi in the draft of air while the aeroplane is in flight. The fuel reaches the carburetor through the second connection by overcoming the vacuum created through the former. This may be accomplished by maintaining greater suction or by positive feed pumps, preferably gear or vane type, mounted on the interior of the tank. To insure proper functioning at all times the tank is enveloped in some elastic material, preferably rubber, which covers any ragged holes in the metal that a bullet might make upon entering. This covering, due to its elasticity, returns practically to its former state after being pierced and leaves a hole so small that it can hardly be detected. The tank may be literally made a sieve by bullet holes and still function properly.

The principle of operation is quite analogous to a very simple example. Almost everybody is familiar with the fact water will not pour out of the neck of a bottle if the latter is turned upside down quickly. This is due to the partial vacuum above the fluid which will hold the liquid in the bottle until the vacuum is destroyed by the entrance of air. The simplest way to do this is to pour the liquid out with the bottle in a horizontal position or to provide a second opening such as we are accustomed to make before we pour milk out of a can. The air entering one hole allows the fluid to flow out of the other. It follows that if we desire to keep the fluid in the can all we have to do is to maintain sufficient partial vacuum above the liquid regardless of how many holes the can may have. This is what Weinberg did, and he produced a vacuum in a very simple way by the speed of the aeroplane itself.

The application of this principle not only makes a tank leak proof but makes it explosion proof as well, to cause an explosion there must be a combustible mixture of air and fuel, but in the Weinberg tank no such condition exists on account of the rarefied air. The flames starting on the outside of the tank from an incendiary bullet are immediately drawn into the tank through the bullet opening and are extinct below the fuel. Any bullet striking above the fuel cannot cause ignition by reason of the vacuum existing there. In fact the inventor in testing his tank originally had no incendiary bullets at his disposal so after shooting holes into the tank he directed a torch against the openings made by the bullets.

It has been discovered that a bullet rarely goes completely through a tank. In most cases it will penetrate one side and will lose its energy so completely while passing through the liquid that it will drop into the tank. It may be paradoxicaly but truly asserted that the fuel tank which formerly possessed the greatest danger to the pilot has now become his best bullet proof protection. A tank which eliminates the danger of fire and leaks should be of value on aeroplanes during peace times as well. Leaking tanks have been the cause of many fires in midair, which invariably have burned the pilots before they could reach the ground and escape.

The final tests were made at the aviation experimental station, McCook Field, Dayton, Ohio, in the following manner. Two identical tanks, one made according to Weinberg invention, the other covered with elastic materials prepared by the Science and Research Division of the War Department, were shot at side by side with armor piercing and incendiary bullets. The latter tank caught fire after the third shot, while the Weinberg tank was penetrated by fifteen armor piercing bullets, which were followed by seven incendiary bullets, and neither leak nor explosion occurred.

NOTES ON GERMAN DESIGN AND CONSTRUCTION*

By E. BOUDOT, Aeronautical Engineer

THE following notes are intended to give a succinct but precise and—as far as possible—complete idea of the methods of design and construction adopted in Germany. Many ways of reaching that object may be found. The one we propose to follow is to confine our analysis to only one machine at a time, to give all available information about the general and detail design, and illustrate it by dimensioned drawings, for which we are greatly indebted to our contemporary *l'Aerophile* and to the authorities of this country, who have opened a most interesting exhibition of German aeroplanes and engines.

The Albatros Aeroplanes

The most pre-eminent and probably the best designed German aeroplanes are those produced by the Albatros Flugzeugwerke Gesellschaft, of Johannistal.

The Albatros aeroplanes may be ranged into two classes:

1. The single-seater fighting biplanes, used only for fighting purposes. They carry two guns firing through the propeller disc and a variable load of ammunition. Their identification mark is D, which letter is followed by a number, giving the number of the design. Thus the single-seaters are marked D I, D II, D III.

2. The two-seater biplanes, "reconnaissance" type, used principally for reconnaissance work, artillery spotting, and photographic work. They carry two guns, one fixed, firing through the propeller disc and used by the pilot, who sits in front; the other one, reserved to the observer, is mounted on the usual circular gun-mounting. They are identified by the letter C. Thus we find C I, C II, C III.

In most cases the difference between two consecutive designs of the same type is very slight, consisting in many instances of shortening or lengthening the span by a foot or so, or by changing the position or the form of the radiators. To follow those modifications or alterations carefully would unnecessarily intricate the description. We will choose one particular design number, and will mention the alterations or modifications found in previous or subsequent designs.

Albatross C III

General Characteristics — "General purpose" aeroplane. Two-seater, pilot in front, observer at the rear.

Six-cylinder vertical engine, 170 h.p. Mercedes (water-cooled).

Overall span: top plane, 11.75 m. = 38.8 ft.; bottom plane, 11.15 m. = 36.7 ft.

Overall length: 7.90 m. = 26.0 ft.

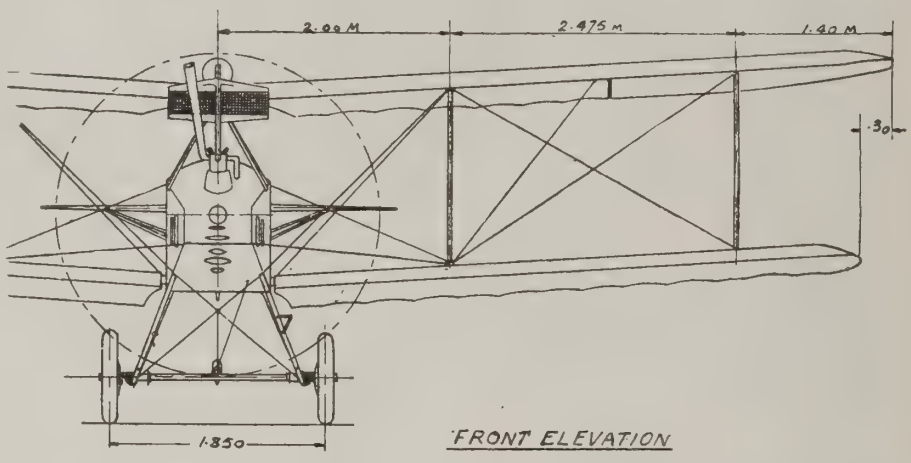
Chord: top plane, 1.800 m. = 5.93 ft.; bottom plane, 1.700 m. = 5.6 ft.

Gap: 1.55 m. = 5.1 ft.

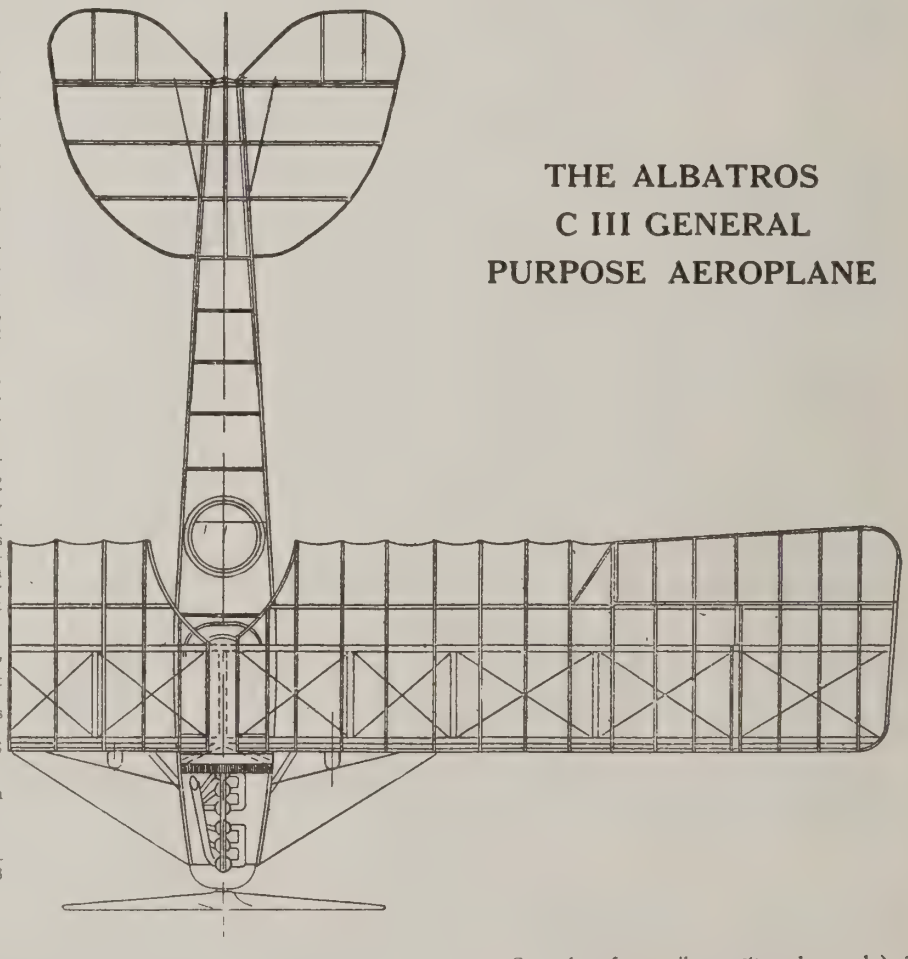
Dihedral: 2°.

Wing area: top, 19.75 sq. m. (including ailerons) = 214 sq. ft.; bottom, 17.75 sq. m. = 193 sq. ft.

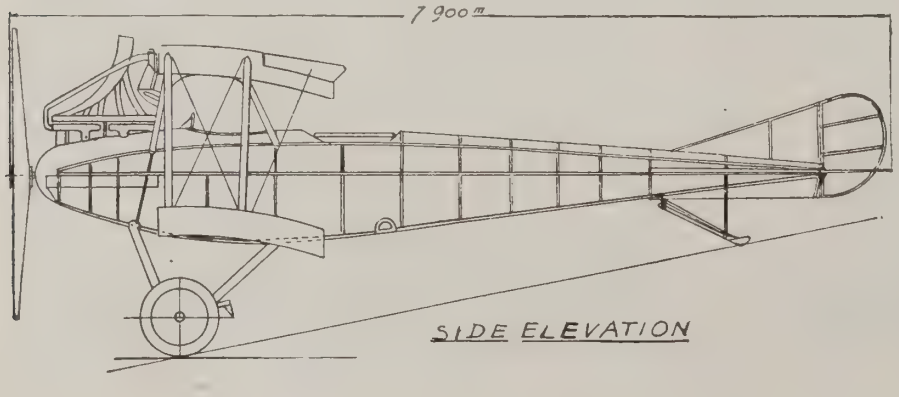
Total wing area: 37.50 sq. m. = 407 sq. ft.



FRONT ELEVATION



THE ALBATROS C III GENERAL PURPOSE AEROPLANE



SIDE ELEVATION

Control surfaces: ailerons (top plane only), 3.0 sq. m. = 32.5 sq. ft.; elevators, 1.3 sq. m. = 14.1 sq. ft.; rudder, .6 sq. m. = 6.5 sq. ft.

Stabilizing surfaces: fixed tail plane, 3.0 sq. m. = 32.5 sq. ft.; fin, .5 sq. m. = 5.4 sq. ft.

Weight (empty): 830 kg. = 1,830 lbs.

Useful load: 435 kg. = 960 lbs.

Total weight: 1,265 kg. = 2,790 lbs.

Wing loading: 33.7 kg. per sq. m. = 6.9 lbs. per sq. ft.

Power loading: 7.45 kg. per h.p. = 16.4 lbs. per h.p.

Aerodynamic Qualities

Probably the most characteristic feature of this machine is the wing section used. Instead of using a low cambered section usually found on modern machines and very efficient, the Albatros designer has used a form of aerofoil very similar to Eiffel No. 14.

The reason for this choice must be found in the rather high wing loading for this type of machine. High wing loading as compared with low wing loading means:

* Courtesy of *Aeronautics*.

AIRCRAFT WIRES AND CONNECTIONS

By SIDNEY CAMM

IN all aeroplanes the question of wires and the terminal connections associated therewith is a matter of some importance, and there is little doubt that the efficiency of modern wiring systems is largely responsible for the structural efficiency of the aeroplane as a whole.

Aeroplane construction consists almost exclusively of a framework of wood braced by wires, a condition of things which has obtained since the inception of flight, as may be judged by the various engravings of Henson's projected monoplane of 1842. This machine incorporated an arrangement of king-posts and wires, approximating very closely to modern practice, and the natural sequence of improvements have tended towards the gradual elimination of exposed wiring.

The various wires used in construction may be classified into four distinct types; the solid wire stay, the straining cord or cable used for stay wires, the extra flexible cable for controls, and the swaged tie-rods in plain or streamline form. The earliest form of bracing was of the solid piano-wire variety, this having been used on most aeroplanes from the days of the Wrights onwards. From the viewpoint of the early pioneers, this wire was eminently satisfactory, being cheap (a vital consideration) and simple to attach and replace. Although the tensile strength of this wire cannot probably be excelled, its hardness renders somewhat difficult the forming of the end loop without fracture of the wire.

For this reason piano-wire gradually gave place to a softer grade of wire which, while being strong, was tough and ductile, enabling bends to be made with a lessened danger of fracture. The original connection used for the piano-wire stay is shown by Fig. 1, this consisting of a loop or eye, the free end being turned round a ferrule of soft copper tube, this being sometimes varied by the use of a flat strip of tinned iron, wrapped round and soldered. While this was fairly satisfactory for short stays, it was hardly suitable for the main lift wires of the inter-plane bracing, owing to the comparative ease with which, under load, the free end pulled or cut through the ferrule, so that after a while the oval spring-wire ferrule, Fig. 2, came into use. This is made of the same gauge wire as the stay, and is from seven to nine convolutions in length. The eye should be formed as an easy bend, and not kinked, the ferrule being pushed tight against the shoulders, and the free end turned back.

Tests undertaken at the instance of the American Advisory Committee for Aeronautics showed that 80 per cent. of the wires tested failed by the free end pulling through the ferrule, the remaining 20 per cent. failing by fracture, the stays possessing an average efficiency of 68 per cent. of the maximum strength of the wire. Although various modifications, such as tying the free end to the ferrule with fine wire, as in Fig. 3, resulted in an increase in total efficiency, average European practice consists of that shown by Fig. 2. At the present time the solid-wire stay of the form dealt with is used mainly for the bracing of the fuselage frame, and the internal wiring of tail planes.

The gradual increase in engine power and total weight of aeroplanes, led to the adoption of stranded cable for all important loaded wires, this being made in two distinct ways.

The cable employed for inter-plane bracing is composed of a number of fine wires, varying from nineteen to thirty-seven, according to the different diameters, the end section being indicated by Fig. 4.

Where extra flexibility is required, such as for control wires running round pulleys, the cable is composed of a number of strands, generally seven, which in turn consist of a number of fine wires, usually nineteen, the end section being shown by Fig. 5.

English practice designates this form of cable as extra flexible, and the single rope of nineteen wires as straining cord.

American classification is practically the reverse, in that the single rope is known as stranded cable, and the multi-strand as cord. Although the factor of strength is an important one, it does not entirely govern the selection of a wire, as other considerations, such as flexibility and fatigue strain, influence greatly the efficiency of a stay under active service conditions. Under test the solid wire possesses the greatest ultimate breaking weight, the next best being the single rope. It must be understood that in flight a wire is subjected to constant and intensive vibration, which must have a deleterious effect on the material, and for this reason a flaw or slight fracture in a solid wire may escape notice until complete failure in the air, whereas the cable, by the unstranding of the damaged wires, would give warning of wear.

Chiefly owing to the difficulty of forming a satisfactory splice in the single-strand cable, modern practice inclines toward the use of the multi-strand cable for all purposes, as the construction of this wire lends itself to the forming of a successful splice.

The earliest form of terminal connection for stranded cable consisted of a loop, the free end being bound to the main part of the wire and soldered. With the addition of a serving or binding of wire round the loop to prevent injury, due to contact with the wiring lug or strainer eye, this wire, in a recent test, gave an efficiency of 100 per cent. for all diameters up to one-quarter inch.

This result, considering the elementary nature of the joint, is surprising. Unfortunately, the effect of corrosion due to acid and solder is a somewhat doubtful quantity; moreover, the appearance of the joint is far from neat. An attachment, which at one time achieved some popularity, is shown by Fig. 6, and is especially suitable for the single-strand wire. This consists of a cone-shaped forked end, with a taper hole, into which the cable is inserted, the free end being unstranded, spread out and soldered. This attachment has been used on what was at one time one of our best products. The efficiency obtained with this fitting is in the neighborhood of 100 per cent.

In the method indicated by Fig. 7 a piece of flat copper tube is passed over the wire, the free end of the latter being bent round a brass thimble, and then passed through the copper tube, in a similar manner to the connection for the solid wire in Fig. 1. The tube is then given several turns, and the complete joint well soldered. This system is reliable, and has given good results.

A distinctive terminal is indicated by Fig. 8, consisting of a brass ferrule, just sufficiently wide to accommodate the two thicknesses of wire. The bolts are of the counter-sunk head variety, so that the operation of screwing a bolt home also forces the wires into the protuberances in the sides of the ferrule. Although the foregoing methods have all been extensively used, they have now given place to the thimble splice, Fig. 9, which, as a general proposition, is undoubtedly the better terminal connection. The brass thimble protects the strands from the wearing effect produced by contact with the turnbuckle or wiring lug. It is the usual practice to wrap the splice with a binding or serving of fine copper wire, or waxed twine. The efficiency of this joint with a properly made splice may be safely taken as 85 per cent. of the total strength of the wire. With this joint the point of failure, as evidenced by numerous tests, always occurs at, or near, the last tuck in the splice, at which point the extra thickness of the splice is just merging into the normal thickness of the wire. The disadvantage with all terminal connections which necessitate the use of solder is the impossibility of determining just how much the heating operation affects the strength of the wire, and also the effects of corrosion, set up by the various species of flux used in the process of soldering. For a given diameter the solid-wire stay possesses the greatest strength, the next best being the single-strand cable, as the following comparison of stay strength, taken from the report of the National Advisory Committee for Aeronautics, 1915, of America, will show:

Material	Diameter	Strength of Material	Strength of Stay
Wire, solid.....	3/16"	5,500 lbs.	5,100 lbs.
Strand, single.....	3/16"	4,600 lbs.	4,100 lbs.
7x19 multistrand..	3/16"	4,200 lbs.	3,500 lbs

Although in the quest for increased speed the number of exposed wires were reduced to a minimum, the aggregate resistance still remained considerable, this leading to the development of the swaged streamline wire, the introduction of which is generally ascribed to the Royal Aircraft Factory, and these wires are now generally used for all exposed wiring. The points in favor of them are that, properly fitted, a considerable reduction of resistance is obtained, there is a lessened liability to slacken after some use, this rendering rigging a more certain operation, and the nature of its connection obviates the use of turnbuckles.

They have been variously criticized as being expensive to produce, that the resistance may be increased if improperly aligned in the machine, and also that any fracture or flaw is less liable to be detected before complete failure during flight. In manufacture the solid rod is rolled to the section shown by Fig. 10, a certain length each end being left for the right- and left-hand thread. Two of the connections mostly used are shown by Figs. 11 and 12. To prevent wear at the points of intersection, it is usual to fit acorns of fibre or aluminum, a popular form being shown by Fig. 13. Some designers still prefer to use the wire cable for inter-plane bracing, a fairing of wood being bound to the cables by tape at intervals, this also preventing excessive vibration.

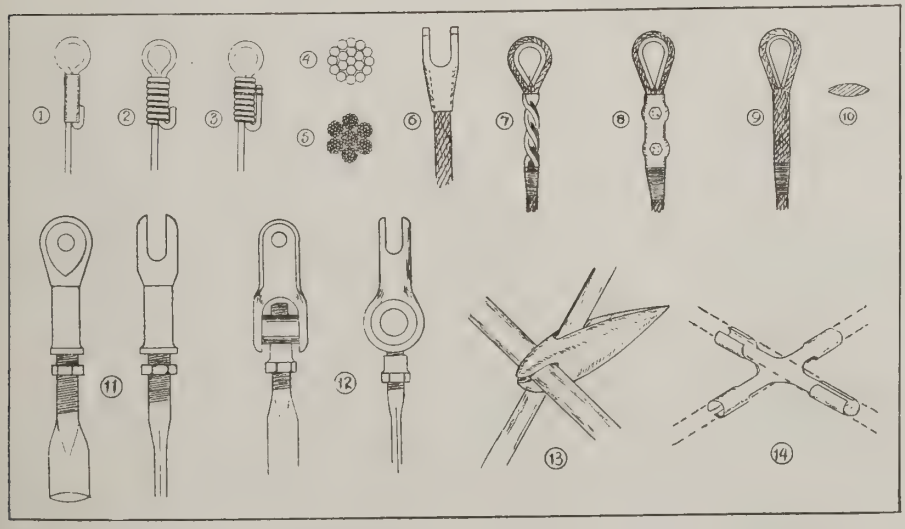
Some years ago various attempts were made, mostly on French monoplanes, to utilize flat steel ribbon for exposed wiring, but, owing to the difficulty of successfully forming a terminal, its use never became extensive, although it may possibly be regarded as the precursor of the modern streamline wire.

It is notable that, so far, the wiring of all German aeroplanes is effected by cable, so that apparently the merits of the streamline wire are not recognized. It is also surprising that no attempt has been made to streamline the cable. A device for tying the wires and preventing the friction at the point of intersection found on nearly all enemy aeroplanes is indicated by Fig. 14, and there are also instances of quick-release devices, these being popular in England about 1912.

Although determined attempts have been made of late to entirely eliminate exposed wiring, examples of this occurring in the recent German Fokker triplane, it appears that the various alterations engendered by this procedure in the structure of the machine more than counteract the saving in head resistance.

Moreover, with modern methods of construction, the ultimate strength of a wireless wing structure leaves considerable room for improvement, and the price paid for the saving is too great.

The arrival of the all-steel aeroplane would entirely alter the condition of things, as with this construction much better chances exist for the production of a reasonably strong wing structure, without exposed wire bracing.



Figures 1 to 12—Types of wire and cable terminals. Figures 13 and 14—Clips to prevent vibration and friction where cables cross one another

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Olcott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in order named.
Note 2—Report to Chief of Air Service, Washington, D. C.
Note 3—Report to Middletown, Pa., to supply depot.
Note 4—Report to Wright-Martin Aircraft Corp.,Long Island, N. Y.
Note 5—Report to Technical Section, Dayton, Ohio.
Note 6—Report to 25 South Main Street, Dayton, Ohio.
Note 7—Report to Little Building, Boylston and Tremont streets, Boston, Mass., and wire DAP.
Note 8—Report to 360 Madison Avenue, New York City, to district manager aircraft finance.
Note 9—Report to General Hospital No. 32, Chicago, Ill.
Note 10—Report to Fort Crook, Nebraska, for duty to commanding officer.
Note 11—Report to Little Rock, Arkansas, to commanding officer.
Note 12—Report to Panama Canal Zone, Ancon, Panama, France Field, Coco Walk.
Note 13—Report to Indianapolis, Indiana, and wire DMA.
Note 14—Report to Godman Field, Camp Knox, Stithton, Ky.
Note 15—Report to 2050 Elmwood Avenue, Buffalo, N. Y.
Note 16—Report to Aviation General Supply Depot, San Antonio, Texas.
Note 17—Report to General Hospital No. 21, Denver, Colo.
Note 18—Report to Los Angeles, Cal., for duty.
Note 19—Report to Gas Plant No. 3, Petrolia, Texas.
Note 20—Report to General Eastern Department, N. Y.

Special Orders Nos. 41 to 49, Inclusive

A
Andrews, Roger W.....LHV
Albrook, Frank P.....WFO
Adams, James E.....Note 20

B
Braun, Milton F.....SAG
Boyd, William P.....AHT
Beattie, Harold G.....EOT
Brown, Roy S.....RSD
.....DAP
Bleakley, Wayne W.....LHV
Brett, George H.....LHV
Berger, George R. B.....Note 8
Burns, Thomas E.....DMA
Browne, William O.....CAF
Baldinger, Ora M.....DMA
Brown, Herbert S.....LHV
Bogardus, Arthur G.....MDO
Bailey, William M.....EOT

C
Clark, John M.....BFT
Coyle, Arthur J.....PFO
Conover, Harvey .....Note 9
Campbell, Douglas .....JMA
Conant, William M., Jr.....DAP
Caldwell, Ralph C.....DMA
Chapman, Carleton G.....Note 13

D
Douglas, David Dwight.....LHV
Dunlap, John R.....CGC
Donaldson, John O.....JMA
Degon, Elmer F.....Note 12
Carrow, Arthur M.....Note 4
Dorwart, Frederick G.....KST
Doust, Horace Tyner.....SAG

E
Erwin, William P.....PFO
Easterling, Anthony M.....PFO

F
Fairchild, Muir S.....EOT
Fisher, Walter C.....KST

G
George, Harold H.....LHV
Garrison, William H.....Note 16
Gerlach, Fred L.....Note 8
Goodwin, Oren Pakenham.....Note 3
Gibson, Henry K.....Note 2

H
Hooper, Harley L.....PFO
Higgins, Joseph T.....RSD
Heath, Lawrence Rockwell.....ABC
Hartman, Harrison J.....SAG
Hall, James G.....DMA
Harper, Earle G.....Note 7
Hyer, Benjamin B.....VBW

I
Inglis, Henry B.....Note 5

J
Jones, Aaron E.....BFT
Johnson, Walter S.....Note 8
Joyce, John Neal.....Note 6

K
Kendrick, William J.....DMA
Krapf, George W.....ABC
Kendall, John D.....Note 12
Knight, Duerson .....DMA
Keating, James A.....JMA

L
Lawson, Norman .....DMA
Lyon, Charles S.....LHV
Lee, Bernard W.....WFO
Lee, Everett J.....Note 8
L'Ehmann, Chester L.....EOT
Lancer, John Joseph.....Note 10

M
Martin, Frederick L.....DMA
Mercer, William Elmer.....MAC
MacIlwain, William H.....PFO
McNeil, Guy L.....PFO
Milyard, Raymond C.....PFO
Mohr, James H.....EOT
McRae, John .....DMA
Miller, Clarence L.....Note 15
McCammon, Edward Eugene.....DAP

N
Nolan, Edward J.....LHV
Neville, Ralph M.....DMA; Note 19 Note 1

O
Owen, Thomas Henry.....DMA

P
Pierce, Hugh M.....BFT
Pilcher, Rufus J.....PFO
Peterson, David McK.....JMA

R
Rickenbacker, Edward V.....JMA
Rice, Ward H.....Note 12
Ronan, Arthur Thomas.....Note 8
Reynolds, John N.....Note 14
Robinson, Paul P.....Note 7

S
Stratton, Lynn L.....FRF
Stetson, John B., Jr.....LHV
Schwab, Emil F.....LHV
Sudlow, William B.....EOT
Struthers, Parke H.....LHV
Saunders, Bradley J., Jr.....LHV
Spring, E. W.....JMA
Scholle, Howard A.....DMA
Sloan, Kellogg .....Note 5
Shewmon, Dan D.....Note 17

T
Thach, Robert G.....LHV
Trefry, Howard W.....WFO
Thaw, William .....JMA

V
Van Valer, Claude O.....DMA

W
Wise, Stuart W.....MIA
Weed, Harry D.....MDO
Winslow, Julian E.....EOT
Wrinkle, John Stuart.....Note 7
Ward, Henry Jay.....Note 5

Y
York, Duke A.....PFO

318 Consecutive Loops Made By Lieut. Maynard In France

According to official information received by AERIAL AGE WEEKLY, on Lincoln's Birthday a new world's looping record was established at Romorantin, France, when Lieut. Belvin W. Maynard, U. S. Air Service, made 318 consecutive loops in 67 minutes, thus breaking the record made about two weeks before at Issoudun by Lieut. T. N. Joyce, who looped 300 times in 66 minutes. As in the case of Lieutenant Joyce, Lieutenant Maynard looped until his gasoline gave out and landed with a dead stick.

The machine used was a Sopwith-Camel with a 150 h.p. Monosoupape Gnome motor. The unusual strain apparently did not injure the plane in any way, as a thorough inspection showed it to be in perfect condition after the flight.

Lieutenant Maynard has the distinction of being one of the few real "sky pilots" in our army, as he was a student at the Wake Forest, N. C., Theological Seminary up to a short time before the United States entered the war. His home is at Mt. Olive, N. C. He enlisted in the Air Service in August, 1917, and received his ground school training at Ohio State University. Upon completing the course in ground work he was sent to France for flying instruction and was graduated from the American schools at Tours and Issoudun. From Issoudun he went to Romorantin, the assembly depot for the Liberty-motored DeHaviland-4's, where he was one of the first American pilots to fly that machine in France. When the armistice was signed he was acting as a test-pilot at Romorantin.

To Return Soon

The following organizations have been assigned to early convoy: 157th, 370th and 639th Aero Squadron.

A cabled correction reads:

On the transport *Plattsburg*, which sailed from Brest February 26 and is due to arrive at New York March 6:

"37th Aero Squadron, 9 officers, 168 men"

should read "49th Aero Squadron, 9 officers, 168 men."

The transport *Patria* sailed from Marseilles March 2 and is due to arrive at New York about March 14, with 34 casual officers of the Air Service on board.

Over 4,800 Liberty-12 Engines Shipped to Storehouses Since Armistice

The Statistics Branch of the General Staff, War Department, has made up the following table, which shows the number of planes and engines shipped by the Bureau of Aircraft Production to depots and storehouses from the date of the armistice to February 14:

Liberty 12 service engines	4,806
OX-5 elementary training engines	1,261
Le Rhone advanced training engines	994
De Haviland-4 observation planes	524
Hispano 180 advanced training engines	343
Hispano 150 advanced training engines	254
JN6-H advanced training planes	174
JN4-D elementary training planes	131

War Risk Insurance—Applications for Insurance Must Be In Writing

Circular No. 103, W. D., February 26, 1919, Y 824, D. M. A., quotes the following decision of the Bureau of War Risk Insurance:

"In this case ————, Battery ————, Battalion ————, enlisted on June 30, 1918. He did not make out an application for insurance. On October 7, 1918, after being taken to the base hospital at his camp, he expressed a desire to make application for insurance. His commanding officer prepared an application and took it to the base hospital to obtain the soldier's signature, but, being unable to find the soldier, mailed the application to him. This application was not received by the soldier before his death, October 16, 1918.

"The question is then presented as to whether the soldier's oral expression of a desire to make application for insurance constitutes an application for insurance.

"In this case no valid application for insurance has been made for the reason that application for insurance must be made in writing."

Honorably Discharged

The following officers of the Air Service have been honorably discharged:

Lieutenant-Colonel Robert Glendinning.

Majors Charles H. Hammond and Frank H. Maguire.

Captains Leonard C. Hammond, Claude O. Van Valer, Charles M. Fleischmann, Henry I. Brock, Charles L. Heater, Roscoe G. Kincaid, Walter L. Saunders, John S. M. Eley and Harford W. H. Powel, Jr.

First Lieutenants Harry J. Kennedy, John K. Willcox, Tom S. Patterson, Robert L. McClure, Paul P. Immel, Leo M. Harlow and Walter A. McDonald.

Second Lieutenants Robert G. Elbert, Robert H. Doutt, James A. Johnston, Jr., George D. Kingsland, Louis A. Giroux, Edward L. Bullock, Jr., Herbert J. Stack, James C. Hayes, Efford A Beverly, Anthony E. Nommensen, James W. Huntley and Norman C. Granniss.

New R. M. A.'s

The following officers have been rated as Reserve Military Aviators from the dates set after their respective names:

Major Ora M. Baldinger, A.S.A., January 30, 1919.

Captain Gordon Baker, A.S.A., January 30, 1919.

First Lieutenant William D. Prindle, Infantry, February 12, 1919.

First Lieutenant William M. Bailey, A.S.A., February 12, 1919.

First Lieutenant James Wade Jenkins, A.S.A., January 30, 1919.

First Lieutenant Fielding B. Cochran, A.S.A., January 30, 1919.

First Lieutenant Donald G. Duke, A.S.A., January 30, 1919.

First Lieutenant Raymond C. Brown, A.S.A., January 30, 1919.

First Lieutenant William B. Remington, A.S.A., January 30, 1919.

First Lieutenant Charles M. Leonard, A.S.A., February 11, 1919.

First Lieutenant Earl D. Stearns, A.S.A., January 27, 1919.

First Lieutenant Sam George Epstein, A.S.A., January 27, 1919.

First Lieutenant Joe Thurmond, A.S.A., February 14, 1919.

First Lieutenant George V. Bonhag, A.S.A., February 11, 1919.

Second Lieutenant John L. Salway, A.S.A., January 30, 1919.

Second Lieutenant Stanley Clarke, A.S.A., February 10, 1919.

Second Lieutenant Milton Barratt, A.S.A., February 11, 1919.

Second Lieutenant Ralph A. Gibson, A.S.A., February 11, 1919.

Second Lieutenant Alfred D. Karr, A.S.A., February 11, 1919.

Second Lieutenant Granville C. Johnston, A.S.A., January 27, 1919.

Second Lieutenant George K. Pond, A.S.A., January 27, 1919.

Second Lieutenant Arnold M. Kent, A.S.A., February 12, 1919.

Senator New Objects to Sale of Army Aircraft Equipment at Fraction of Cost

Members of the United States Senate Committee on Military Affairs have revealed to the New York *Sun* an intention by the Secretary of War, Newton D. Baker, to wreck and dismantle the nation's air service, to hand over to a few shrewd dealers in the good graces of the Administration equipment at less than junk prices and to make no provision whatever for such commercial aircraft service as Great Britain and other nations are now working night and day to develop.

The facts are so astounding as to be incredible were they not supported by the evidence in the possession of Senators whose statements are not open to doubt—Harry S. New of Indiana, James A. Reed of Missouri and others. As members of the sub-committee on aviation of the Military Affairs Committee these Senators have gathered official information (some of it confidential) which exposes the almost unbelievable design on the part of the Secretary of War to junk the whole aircraft service of the United States with hardly any return to the Treasury, yet with immense profit to the lucky "buyers"; to give away virtually property which cost the taxpayers in a year and a half more money than it required to run the whole Government before the war, and all with absolute blindness to the needs of the future.

On the authority of Senator New of Indiana, probably the best informed man in the country regarding the past, present and future of aircraft, the New York *Sun* states that the Administration purposes these destructive aims, in flat rejection of the will of Congress:

1. To reduce the air service from 30,000 aviators, costing $10,000 a man to develop, and 30,000 skilled mechanics and assistants, to 3,000 pilots and 3,000 mechanics.

2. To sell at private bidding, on such terms as would virtually be giving away Government property, the greater part of 7,580 training aeroplanes in this country and 6,334 service and training planes in France.

3. To sell at private bidding the greater part of 20,000 Liberty motors, on terms that conscientious manufacturers denounce as ridiculous, even scandalous.

4. To sell at private bidding 30,000,000 feet of selected spruce, costing $800,000,000, at a price which would yield but a small percentage of the original cost.

5. To sell at private bidding 7,000,000 yards of aeroplane linen at terms equally disastrous to the Government, however favorable to the bidders.

6. To abandon 30 aerodromes and balloon depots at an immense sacrifice and without the slightest provision for the future of commercial aeronautics.

7. To kill at a blow an industry (the manufacture of aeroplane motors and aeroplanes and spare parts) which under any encouragement might be expected to grow into one of the substantial industries of the country, and which certainly would be indispensable if the United States is to keep pace with Great Britain.

8. To deprive many thousands of skilled laborers, urgently needed for years to come, of work and to throw them into other occupations, thus contributing to labor unrest and materially increasing the problem of reconstruction.

9. To destroy the splendid morale of the air service by robbing the service of identity and requiring that officers of the service may only be obtained by temporary detail from among officers of corresponding grades in other branches, thus serving notice on young officers of demonstrated efficiency during the war that they cannot hope for many years to exercise positions of command and responsibility in any way equal to the positions they earned by the intelligence, devotion and courage of their war service.

10. To deny to the inventive genius of America and the manufacturing intelligence and energy of America the opportunity, even the right, to carry the country forward to the first place in commercial and military aeronautics, or at least to a place equal to that which Great Britain now seeks.

Anti-Freezing Mixtures for Radiators

The Motor Transport Branch, Supply Section, O.D.M.A., is in receipt of latest reports on anti-freezing mixtures for radiators from the U. S. Bureau of Standards. This information is on file in this branch and is available to anyone interested.

General Mitchell Says Planes Would Have Been Used to Transport Troops to German Rear in Spring

New York, N. Y.—Brig. General William Mitchell, who served two years with the air service of the A. E. F. abroad, told the meeting of the Society of Automotive Engineers held in the Engineering Societies Building, 29 West Thirty-ninth Street, on March 7, that in the last two months of the war the American aviators were so successful that the Germans seldom dared attack them.

If the war had lasted until spring, he said, the aviation service had planned to co-operate with the infantry very extensively by dropping men with machine guns in parachutes behind the German lines, thus providing a way to attack the Germans from the rear, simultaneously with a frontal onset.

Speaking of the aerial combats at St. Mihiel and illustrating his talk with stereopticon views, General Mitchell instanced the work of the first pursuit group under Colonel Hartley. These enterprising young men, he said, shot down 110 German planes and lost only ten machines.

Air Service Units Returning

The battleship *Louisiana* sailed from Brest on March 5 and is due to arrive at Newport News on March 17, bearing, among other units, Balloon Wing Companies D, E and F.

The battleship *South Carolina*, due to arrive at the same place and date, is returning with the 5 officers and 164 men of the 5th Air Park.

Clothes for ex-Soldiers Needed

The reclamation shop of the National League for Woman's Service, 21 West Forty-sixth Street, is urging contributions of men's wearing apparel of all kinds for discharged soldiers, stating that civilian clothes are necessary for them to obtain work. Clothes that cannot be delivered will be called for.

Admiral Sims Congratulates Naval Airmen Through Aero Club of America

President Alan R. Hawley of the Aero Club of America received the following wireless message on March 5 from Vice-Admiral William S. Sims, commanding the Unitel States Navy in British waters:

"Please express to the naval aviators of America my most sincere appreciation of their courageous and loyal performance of duty at home and abroad throughout the war. Their brilliant exploits, their determination to win, will ever remain one of the highest tributes to American manhood. The performance of duty of these young naval aviators under my command has not only been in keeping with the very best traditions, but won for America the enthusiastic praise of her allies."

Aeroplanes and Engines Shipped to Storehouses Since Date of Armistice

The following statement was prepared by the Statistics Branch, General Staff, War Department:

The following table shows the number of planes and engines shipped by the Bureau of Aircraft Production to depots and storehouses from the date of the armistice to February 14:

Liberty 12-service engines	4,806
OX-5 elementary training engines	1,261
Le Rhone advanced training engines	994
De Haviland 4 observation planes	524
Hispano 180 advanced training engines	343
Hispano 150 advanced training engines	254
JN6-H advanced training planes	174
JN4 D elementary training planes	131

Prisoner Taken Via Air, Indiana to Ohio

Dayton, Ohio.—The Police Department of Dayton on February 26 set an unusual precedent in the transfer of prisoners from one city to another when a prisoner was driven by aeroplane from Indianapolis to Dayton.

Safety Director James, in charge of the delivery of the prisoner to Dayton, said at the end of the trip that he believes the aeroplane will prove valuable to the Police Dpartmnt the country over in the safe delivery of prisoners for whose release there has been public agitation or against whom public feeling runs high.

New Board of Contract Review

Lieut. Col. Jacob E. Fickel, Capts. George W. Price and Louis Montford have been appointed members of the Board of Contract Review of the Division of Military Aeronautics, vice Col. Harold Bennington and Capts. Otis S. Van de Mark and Lewis B. Ticknor, relieved.

Royal Air Force Mail Service Speedy

London.—A fine letter-carrying feat was carried out by the Royal Air Force recently. The Air Ministry received a document at 12.35 p.m., at 1 p.m. a special aeroplane left Hendon, and the letter was delivered by the airmen in Cologne before dusk. The 300 miles was flown with one stop near the French coast.

FOREIGN NEWS

Albert Visits Army by Aeroplane

Brussels, March 4.—King Albert of Belgium went to Aix-la-Chapelle on Sunday by aeroplane, visited the headquarters of the Belgian Army of occupation and flew back to Brussels. The trip was made in about 50 minutes each way. The King took care not to fly over Dutch territory.

Caproni Aerobus on Trial Flight

The Caproni aerobus squadron, intended for the proposed passenger service between Naples and Rome, left Cento Celle at 11 o'clock several days ago and arrived at Naples at 12.10. The return flight started from Naples at 2 P. M. and was completed at 3.10.

Royal Air Force to Have 6,500 Officers and 75,000 Men as Peace Standard

London.—Announcement has been made regarding the peace standard for the year 1919 for the Royal Air Force. When hostilities ceased, the force consisted of 30,000 officers and 265,000 men. On January 24 1,724 officers and 51,727 men had been discharged. This process of demobilization will continue until the force is reduced to 6,500 officers and 75,000 men. Officers and airmen will be retained who were not enlisted and posted before January 1, 1916, have not attained their thirty-seventh birthday, or are not entitled to three or more wounded stripes.

A weekly bonus has been added to the pay of all ranks, ranging from 10 shillings weekly for second class mechanics to over 2 pounds for officers ranking above Lieutenant-Colonel.

British Radiophone Progress

London.—An eminent engineer of the Western Electric Company, who was concerned in the development of American aircraft radio telephone sets, who is testing British Royal Air Radio equipment in competition with American sets, is quoted in the British press as stating that after numerous test flights he has concluded that British wireless telephones are far superior to American phones. Standard British equipment permits of conversation between pilot and ground or other planes as far as fifteen miles, while airship sets are standardized for communicating fifty miles.

The Peace Conference aerial ferry planes for service between Paris and London are equipped with radio telphons.

British Metereological Department Operating Fifty Stations

London.—It was recently announced that the British Government, in order to foster commercial aeronautics, was planning to establish meteorological stations for the assistance of airmen. A dispatch to the *New York Sun* announces that already almost fifty such stations are in operation under supervision of general commercial air boards. The energy with which the plans for aerial commerce are being pursued, the correspondent writes, indicates Great Britain's intention to attain aerial supremacy as well as naval supremacy.

Progress of Australia-London Air Route

The syndicate of Australian business men which organized for the purpose of establishing an Australian-London air service, have decided on the establishment of landing places approximately 300 miles apart.

The route is to be from Sydney or Melbourne direct to Port Darwin, in the northern territory of Australia, from which point there will be a 300-mile sea trip across to the Island of Timor in the Dutch East Indies, thence from island to island through Java and Sumatra to Singapore and Calcutta, across India to Karachi, thence to Bagdad and Port Said, from which latter point the choice of several developed aerial routes to London are available.

Next month Mr. Lloyd will lead a surveying party from Australia through the Dutch East Indies, the Malay States, India and Mesopotamia, to locate landing sites and to arrange for their lease or purchase. The organization of the present company is merely to provide for the expenses of this routing party. After the completion of this survey it is proposed to finance a company in London to operate the aerial service to Australia.

Chinese Government Buying Aero-Radio Apparatus

London.—The British Marconi Company is manufacturing two hundred aircraft radio sets for the Chinese Government, according to a statement by Mr. Godfrey Isaacs, managing director of the company.

Porte Flying Boat to Attempt Transatlantic Flight

London.—In addition to the dirigible and Handley Page transatlantic plane, the British Government, according to information recently received, will try a Porte flying boat for the projected flight.

British Surplus Government Property Disposal Board Appointed

London.—In connection with the disposal of surplus State property, an Advisory Council, of which Lord Salisbury is chairman, has been appointed to advise the Minister of Munitions on such questions as may be referred to them. The organization consists of a board, directly responsible to the Minister, to be called the Surplus Government Property Disposal Board, of which Mr. F. G. Kellaway, M. P., Deputy Minister, is chairman, and Major F. C. T. Tudsbery, O. B. E., secretary. The departmental organization is divided into seventeen sections to deal with the different classes of property, one of which will deal with aircraft equipment. Communications should be addressed to the secretary, Disposal Board, Armament Place, Whitehall Building, London, S. W. 1.

Will Try to Fly to Brazil

Paris.—Captain Coli, who recently crossed the Mediterranean and made the return trip within twenty-four hours, will soon make a flight by way of Madrid to Fez and Agadir, Morocco.

He will make an especial study of conditions over the sea in view of his intention to make a flight from Dakar, at the extreme point of Cape Verde, to Pernambuso, Brazil, within the next two months. On this flight he will operate a special machine which is equipped with a fuselage which will keep afloat for ten hours and which will permit the aviator to wait for assistance in case of a breakdown while over the sea.

Handley Page Passenger Ship Exhibited

London, March 4.—Handley Page, the aeroplane builder, has on exhibition the fuselage of an ordinary two-engine machine, formerly used as a bomber over the Rhine. It has the new well-appointed passenger saloon extending full width and about one-third of the length. The fuselage is six and one-half feet high and has armchairs for seventeen passengers, all facing forward, besides windows with a gangway between the seats. There are lamps and mirrors.

This plane is only half the size of the giant Handley Pages, but it makes more than 100 miles an hour. With two 350-horsepower engines, the Handley Page carried 700 passengers to France last month.

British Transatlantic Dirigible Tested

London, March 6.—Great Britain's largest airship, the R-33, which is to attempt a transatlantic flight, made a trial to-day and covered 30 miles in half an hour, landing successfully, in spite of unfavorable weather.

The airship is of the rigid type of dirigibles, 670 feet long, and during her flight preserved a perfectly even keel.

Archies Downed Many Enemy Aircraft

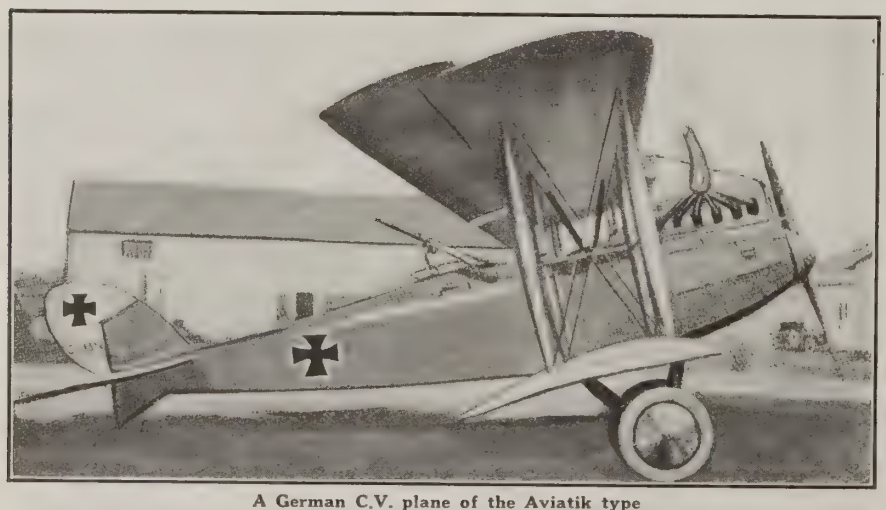
London.—Official figures have recently been issued indicating the effectiveness of anti-aircraft guns and searchlights against the enemy in France. The total bag of the A. A. artillery from January 1, 1918, up to November 11 consisted of 171 planes that were definitely "crashed" or forced to land in British lines and 73 sent down out of control. In addition, machine guns equipped with special sights attached to the infantry accounted for 27 more enemy aircraft, making a grand total of 271 victims of anti-aircraft artillery.

The extensive searchlight service in operation during the last few months greatly increased the hazard to enemy bombing planes. It was a frequent occurrence for enemy planes to be picked up in the beam of one searchlight and passed on to the next, until downed. Devices to detect the location of planes in flight by direction of sound greatly increased the effectiveness of the searchlight service. At least 25 large enemy bombing planes were destroyed as a result of the improved searchlight installation.

Chinese Government to Establish Regular Transport Service

Pekin.—The Chinese Government is preparing to begin an aerial transport and mail service, and has appointed General Tinge, the director of th Pekin-Suiyuan Railway, to be director of the Chinese aerial service. Aeroplanes will be used in connecting Kalgan, an important caravan center, with Siberia, and also in transversing the Gobi Desert.

The success of the British with aeroplane transport in India is believed to have inspired the Chinese Government to make plans for this form of transport. It is understood that an order for aeroplanes has been placed with Japanese manufacturers.



A German C.V. plane of the Aviatik type

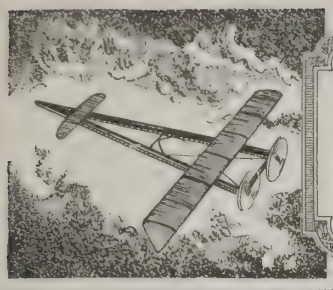
Aerial Transport for Spain

Madrid.—Major Emilio Herrera of the Spanish army, who is planning for a line of aerial transports from Corunna to New York, has obtained the co-operation of a powerful transatlantic steamship company, which has accepted his plans and appointed a commission consisting of Major Herrera, the director of the Madrid meteorological observatory and Lieut. Col. Calbis of the General Staff, who are leaving for Paris, London and Scotland to study the construction of and to acquire large dirigibles.

Aerial service between Toulouse and Morocco via Barcelona was inaugurated recently. The London-Madrid service is about to be started.

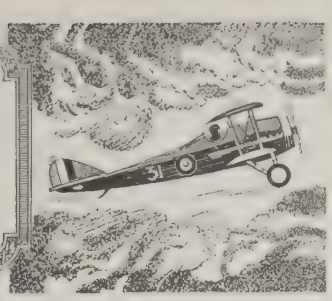
Gas Station for Aeroplane at Panama

The Governor of the Province of San Blas, Republic of Panama, has offered the U. S. Government the use of a portion of Capital Island, Porvenir, for aviation purposes, and he has offered to build a gasoline station there. Co-operating with Navy aviation officers, the commanding officer of France Field, Cristobal, Canal Zone, plans to visit Porvenir in a Navy submarine chaser, and complete arrangements for the establishment of this gasoline station. The importance of such a station is apparent when it is learned from Navy sources that six Curtiss NC-1 flying boats are capable of landing 200 soldiers and equipment at a point along a 700-mile coast in three hours' time.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W., Washington, D. C.
CORRESPONDENCE MODEL AERO CLUB
320 N. Main Street, Rockford, Ills.
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

Model Aeroplane Building as a Step to Aeronautical Engineering

THE writer has received many letters since starting the light aeroplane articles asking different questions as to why I don't make a monoplane instead of a biplane.

The first question is answered by reason of the necessity of combining the most efficient aerodynamical wing section with the strongest construction. In the Ford motored machine I found the R. A. F. 6-wing section best for the machine because of the husky spars that this section allows. This construction gives a factor of safety of 9 in the wings. I had intentions of using the R. A. F. 3 in my new machine but while at the Aeronautical Show, I found in the government book of research that the U. S. A. curves had been retested and showed up better than the first reports had led to believe. Of course these new figures are not to be had as yet, but they will be distributed by the end of May.

From what I heard the U. S. A. curves will be used extensively as the distance of the top camber from the bottom camber is pretty liberal in all the sections, which allows deep wing spars.

I am seriously considering using the U. S. A. No. 1 section in preference to the R. A. F. No. 3 as the L/O is much higher and the Ky as well. This curve will allow great speed with little Horsepower.

That the light weight aeroplane has come to stay can be seen by any one who visited the show. The Gallaudet Company exhibited a small two-seater monoplane of unique design powered with two Indian motorcycle engines of approximately 18 H.P. each or a total of 36 H.P. The propellers, two in number, mounted at the trailing edge of each wing just far enough apart to clear the body when rotating, were driven by a cleverly worked out shaft transmission. A clutch was also in use to allow one engine to keep working if the other failed.

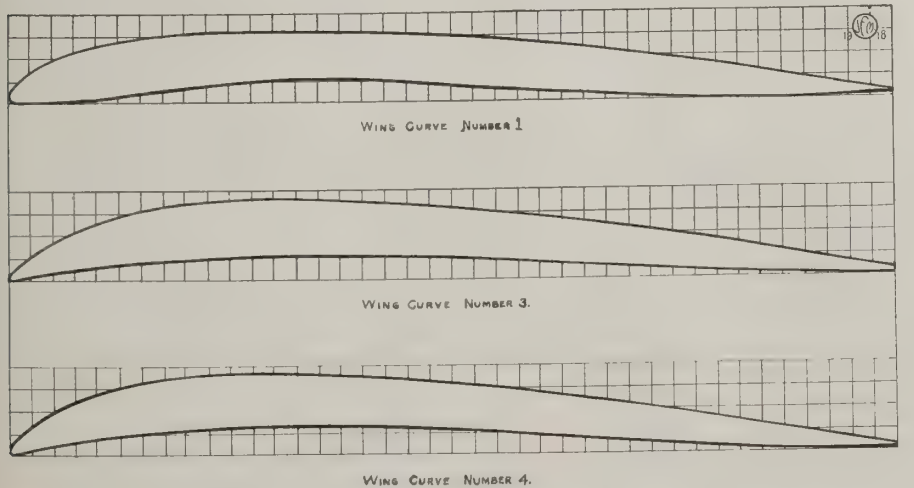
Another interesting machine was exhibited by the Dayton Wright Company. This little "ship" took the eye of every young aviator at the show, the most interested being the Army and Navy pilots. This little machine was in direct contrast to the big ones around it. Somebody remarked that the big Handley-Page would eat it, and it would not be noticed by anybody. The spread of this little machine was 18 feet. Top and bottom wings being the same spread. The weight was something like 450 lbs. Wing section looked like U. S. A. No. 1. The engine in this machine was interesting, a four cylinder two-cycle motor of very light weight, air cooled. The speed of this machine is about 80 miles an hour. These two machines are fully described in another part of the magazine.



Model of the Continental KB-3T described below

As the engine I am about to describe will develop about 27 horsepower, we cannot expect as much as the machines mentioned above, but, we will be well satisfied to get a speed of 60 or 70 M. P. H.

I am negotiating with a machine shop at the present time in regard to making the special crankcases to use with the motorcycle cylinder, and when everything is in working order I will help the readers who have written or applied to me in person in regard to purchasing one of these crankcases. To build an engine of this kind is instructive as well as profitable. In our next article we will consider the possibilities of our machine.



Three U. S. A. Curves the data of which was given some time ago. The first, No. 1, we will use for our machine

Continental K-B-3T Model

The model shown in the accompanying photograph is the work of a mechanical engineer of Omaha, Nebraska, Mr. A. H. Fetters, and if he should enter it in the coming contest it would have an excellent chance of winning the flying model prize for construction. The model follows its big prototype in every detail. The accompanying photograph shows clearly the structural work. The ribs are of standard built-up construction of U. S. A. No. 5 section, weight 1/5 oz. each and are built up of seventeen separate pieces of wood. The wing spars are channelled out to an "I" beam section and the gas tank is carried in top section of wing over body, front section of fuselage is covered with aluminum principally. The spread of the wings is 9 feet. This model would be interesting as a non-flying model, but when one considers the fine workmanship put into it coupled with the fact that it has a power plant and will fly, it increases the interest in this model considerable. Mr. Fetters is to be complimented and we would like to see more of this kind of model construction.



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

The Rookie Speaks

Sitting at mess the other evening down at the Air Service Mechanics' School, one of the Fly-chasers happened among several newly arrived rookies.

"Well," said one, "I do say that a ship can't come down tail first." There was quite a bit of argument about this, but the matter was finally ended by one declaring with great gravity and portentous show of knowledge: "It's like this, fellers. You say a ship can't come down tail first. Well, how about the tail spin? That's one of the most difficult stunts a flyer has to do—bring his ship down tail first and spinning on the tail."

And since no one apparently knew more about the subject, they let it go at that.

No Empty Chair

When Kaiser Bill wearily sits down in St. Helena or somewhere, and gathers his family around him and begins to figure out all he's lost, he'll have one consolation—he can gather all his family around him.

In Other Words—Good Old George Robey

They are silvery in color and in figure,
  They are streamline as regards the head and tail,
And in size they are considerably bigger
  Than a microbe, tho' they're smaller than a whale.
They control themselves a great deal by their tailfins,
  If they try to they can move like many beans,
You will find them in great numbers packed in oil tins;
  In other words—Sardines.

They are frequently in use in aviation,
  And are used by many members of that race,
They are really quite important to the nation,
  And they travel through the air at breathless pace.
They provide us with good optical protection,
  And are guaranteed to be without defects,
Thus permitting clear unlimited inspection;
  In other words—*Eyetects.*



The adventures of "Cyril" in the aviation world. He tests an engine

From *Flight*

Volplanetor

Insoluble
In high air's
Quiescency,
My plane, on earth
A sophist, naively
Reconoitres promiscuously.
Sinuously, nose retrousse,
It spans thinning stratums
Of atmosphere, and volplaning
Deems itself a static medium.
How it routes
Pusillanimous planets
From its path at night,
Dazzling them
Pyrotechnically
With sovereign spectrums
Belched forth sporadically.
My purposelessness
Prognosticates
The heterogeneity
Of world events.
Nevertheless
The sky's oscularity
Propitiates
My primal impulses
And tedium is thwarted.

—Robert M. McAlmon.

That's It!

I quit Elsie!
T'other day
She wrote me.
A fren of mine asked:
"Hoosit from?"
I seys:
"Mos' wonderful gurl livin'."
"Why, she's writin' me, too."
He seys:
Such fickleness.
I quit Elsie!

—*Ellington Field Tail-Spins.*

AERIAL AGE WEEKLY

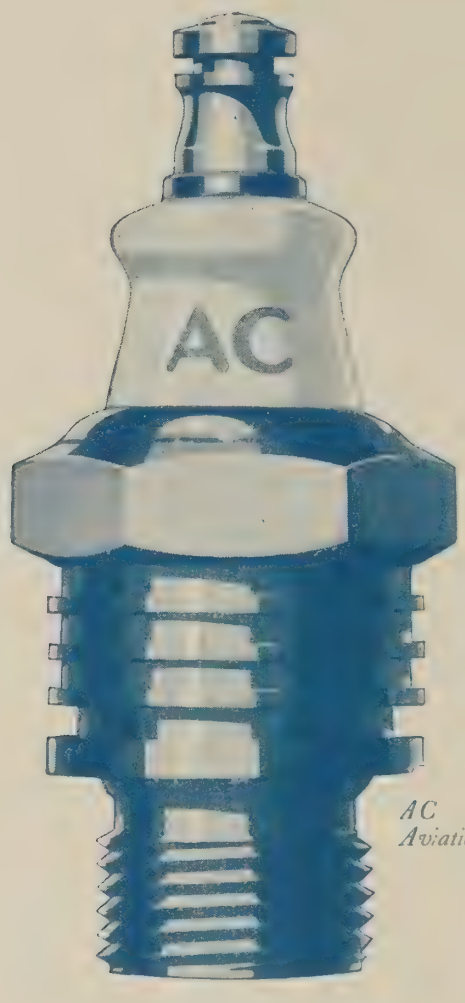
ol. 9, No. 2 MARCH 24, 1919 10 CENTS A COPY



Climbing! A De H 4 in flight at Ellington Field.

Atlantic City Aerial Tournament to Last Throughout Summer

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AC
Aviation Type

WE find that no one really questions the superiority of AC Spark Plugs. In the automotive field, AC is the standard equipment of practically all the leading manufacturers with whom lower price is less significant than quality. When the United States Government needed spark plugs for aircraft service, army engineers investigated all makes of spark plugs, then adopted AC as standard equipment for all Liberty and Hispano-Suiza airplane motors.

Champion Ignition Company, FLINT, *Michigan*

U. S. Pat. No. 1, 135,727, April 13, 1915, U. S. Pat. No. 1,216,139, Feb. 13, 1917, Other Patents Pending

AC

The Standard Spark Plug of America

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INTERCOLLEGIATE AERIAL TOURNAMENT AT ATLANTIC CITY TO LAST THROUGHOUT THE SUMMER

TO enable the hundreds of thousands of college men who were in the Army and Navy and Marine Corps Air Service but have left the service, to continue their training in aeronautics, both as a measure of national preparedness and as a means of facilitating their remaining in the aeronautic movement, the Aero Club of America and the Aerial League of America have arranged to hold a series of intercollegiate tournaments at Atlantic City during the coming summer.

The first of these intercollegiate contests, which are to be held in May, are as follows:

Intercollegiate Seaplane Speed Race

Over a five mile course, for the $2,000 Intercollegiate Trophy. This event is open to graduates and under-graduates whether in military or civilian life.

Dirigible Speed Contest (With Handicap) For the Aerial League of America Silver Trophy

This contest is open to Army, Navy, aero clubs, colleges and aeronautic organizations. It will be held on the afternoon of Saturday, May 3; Saturday, May 10; Saturday, May 17; Saturday, May 24; Friday, May 30, and Saturday, May 31.

Each member of the winning crew of each race will receive a silver plaque of the trophy.

The names of the members of the winning crew of each race will be inscribed on the trophy, which is to be competed for annually.

The race will be for the best speed (under the conditions of the handicap) made at each race.

After these events are over a few weeks will be allowed for preparation and then the following contests will be held:

Three Months Intercollegiate Seaplane Tournament

This will be an intercollegiate seaplane tournament to last three months. The contests will be held every Saturday, and the college holding the largest number of points at the end of the month, each month, will be considered the winner for that month. The second best the second; the third best the third.

But the final winner will be the college which has the largest number of points at the end of the three months.

Each college will be permitted to have three entries. The pilots may be changed weekly, the change being left entirely to the discretion of the college which has made the entry. This plan will permit the testing of a number of collegiate aviators and finding the best. It will also give an opportunity to a college which may have had a very low number of points during the first and second months to catch up with the leader during the last month.

Three Months Intercollegiate Aeroplane Tournament

There will also be held a three Months Land Aeroplane Race, to be governed by the same rules as stated above.

Three Months Intercollegiate Dirigible Tournament

To provide for practice with dirigibles and give opportunities to college men to participate in the development of this wonderful and most progressive branch of aeronautics, there will also be held a Three Months Intercollegiate Dirigible Tournament, to be governed by the same rules as stated above.

The Aero Club of America and Aerial League of America authorities have been assured that the Army and Navy will be glad to co-operate and permit Army and Navy officers who are dirigible balloon pilots to represent their respective colleges in the dirigible balloon tournament.

Three Months Intercollegiate Spherical or Kite Balloon Operating Tournament

In view of the fact that, owing to the nearness to the Atlantic, it would be impossible to hold free balloon races from Atlantic City, plans have been made for holding the Intercollegiate Free Balloon Races elsewhere in the latter part of the Summer. To afford training to college men in the operation of balloons, there will be held a Three Months Intercollegiate Balloon Operating Contest, to be governed by rules similar to the rules for the seaplane tournament.

The contest will consist of the important work of lay out the balloon, inflating, and send it up, with two or more men on board, who will take observations and communicate with the people on the ground by telephone.

The trophy will be awarded for the speed and efficiency in laying out, inflating, and sending up the balloon, as well as for the work of the men on board.

Provision is being made at the Atlantic City Aviation Field for housing the land planes and balloons. Arrangements are also being made for housing and taking care of the seaplanes. Provision will be made for experts to look after the aircraft used for the intercollegiate races, and every facility will be given so that undergraduates, as well as graduates, can compete in the May contests with a minimum loss of expenditure of time.

Great enthusiasm has been aroused in intercollegiate circles by the announcement of these intercollegiate aerial contests, and it is expected that the entries will be numerous and the events will be of great value to the nation, and will be a means of keeping up the development of American aeronautics as well as giving an opportunity to college men to participate in the program of aeronautics.

United States Army, Navy and Marine Corps aviators and balloon observers, in the Service or out of the Service, who wish to compete with the teams of their colleges or to start teams, should apply to Mr. Alan R. Hawley, chairman, Contest Committee, Aero Club of America, 297 Madison Avenue, New York City.

ATLANTIC CITY CONFERENCE AND EXPOSITION COVERS ALL PHASES OF AERONAUTICS

WITH the success of the Aeronautical Exposition which has just closed in Madison Square, blazing a new era in the science of aviation, air pilots, engineers and manufacturers are looking forward with eager interest to the first big outdoor aviation event held in the world since 1914, the second Pan-American Aeronautic Convention and Exposition to be opened during the month of May at Atlantic City.

Reading the war news has made many persons conversant with the theory of flying; the indoor exposition at the Garden has given thousands a practical idea of the construction of aircraft; now those back of the Atlantic City affair believe that open air demonstration where attention will be paid to the commercial end of aviation, will show the business world that flying is a fact and not a fad. The Exposition is to be held under the auspices of the Aero Club of America, the Aerial League, and the Pan-American Aeronautic Federation.

The idea governing the various contests at the Exposition will be in the main to prove that both the heavier-than-air and the lighter-than-air airship can be used to a good purpose in the world of business and the world of pleasure. There will also be lectures by experts on every phase of aviation with pictures and models. The aerial contests will be sanctioned under the rules of the International Aeronautic Federation, which governs all aerial contests.

There will be an efficiency marine flying contests, the awards made under the terms of the will of the late Samuel H. Valentine, being four prizes of $1,000, $500, $250 and $100. The flight will be over a sixty-mile course with the Steel Pier, Atlantic City as a starting point, and the Cape May Naval Air Station as a turning point. The winner will be the pilot who covers the greatest umber of laps on this course flying during the five Saturdays of the Exposition.

Glenn H. Curtiss has offered a prize of $1,000 to the first entrant for the Curtiss Marine Flying trophy who covers the distance of 1,000 miles without stopping. There will also be an open seaplane speed contest for three prizes, $1,000, $500 and $250. Two contests, open to graduates or undergraduates of American colleges, will be the intercollegiate seaplane race and the intercollegiate land aeroplane race. A prize of $2,000 is offered the winner in each of these contests.

There will be Army, Navy and Marine Corps contests in bomb dropping on floating targets. Also there will be the handicap dirigible race for the Aerial League of America's silver trophy. Aerial commuting will be another of the novel contests. To win the several prizes offered to aerial commuters, it will be necessary to have either covered the greatest distance commuting to the Exposition by aeroplane or to have made the most commuting trips, or to have made the longest non-stop commuting trip.

The Aeronautic Convention, which is to be another phase of the Exposition will be the largest event of its kind that the world has ever seen. The program includes an actual demonstration of aeroplanes, seaplanes, dirigibles and kite balloons. The Governments of all the allied and Latin American countries and their aeronautic, sporting, scientific, industrial and educational organizations have been invited to participate.

In order to afford a thorough discussion of the various lines along which aviation and aircraft have been developing, thousands of experts in different lines of endeavor related to aeronautics have been invited to attend. For instance, representatives of railroads, express, steamship and other transportation organizations will be invited to attend the discussion of 'The Large Dirigible and Its Value for Transportation" and the Forestry Department of every State and every nation will send representatives to the illustrated addresses on the "Aerial Forest Patrol.'

Other interesting discussions will be on the "Work of Aerial Police Squadrons and Why Every City Should Have One," "Aerial Mail Plans," "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey," "Aerial Jurisprudence," and "Aerial Navigation Instruments for Flying Over Land and Water."

The following men compose the contest committee for the Aero Club of America, which will have charge of the various contests and the awarding of the prizes: Alan R. Hawley, Lieut. Com. P. L. N. Bellinger, U. S. N.; Col. G. C. Brant, U. S. A.; W. Redmond Cross, Lieutenant Godfrey L. Cabot, U. S. N.; Walter Camp, Col. Milton F. Davis, Col. C. D. F. Chandler, U. S. A.; Major A. B. Lambert, U. S. A.; Major William McElvin, U. S. M. C.; Colonel James Prentice U. S. A.; Major J. C. McCoy, U. S. A.; Commander H. C. Hustin, U. S. N.; Lieut. Com. John H. Towers, U. S. N.; Henry A. Wise Wood and Henry Woodhouse.

AMERICAN ACES AWARDED DIPLOMAS OF MERIT

AT the meeting of the Board of Directors of the Aerial League of America which has its headquarters at No. 297 Madison Avenue, it was resolved to award the League's Diploma of Honor and Merit to the sixty-three American aces.

Diplomas are also to be awarded to the military balloon observers who distinguished themselves and whose services were meritorious.

With the Diploma there will be presented to each ace a fellow membership in the League. In the case where the aces have lost their lives, the Diploma and the membership will be presented to the mothers or parents.

The aces and their parents will be invited to the Aeronautic Convention to be held at Atlantic City from May 1 to June 1, where the presentation of the Diplomas will be made.

The aces to whom the League's Diploma and fellow membership were awarded today are as follows:

Captain E. V. Rickenbacker, of Columbus, Ohio; Lieut. Frank Luke, Jr., of Phoenix, Ariz.; Major Victor Raoul Lufbery, of Wallingford, Conn.; Major Reed G. Landis of Chicago, Ill.; Lieut. David E. Putnam, of Brookline, Mass.; Lieut. Fields Kinley, of Gravette, Ark.; Lieut. G. A. Vaughn, Jr.; Lieut.J. M. Swaab, of Philadelphia, Penna.; Lieut. Thomas G. Cassady; Lieut. C. E. Wright, of Cambridge, Mass.; Lieut. W. P. Erwin, of Chicago, Ill.; Captain E. W. Springs, of Lancaster, Penna.; Lieut. H. R. Clay, Jr., of Fort Worth, Texas; Major James A. Meissner, of Brooklyn, N. Y.; Captain Hamilton Coolidge, of Boston Mass.; Captain G. F. Larner, of Washington, D. C.; Lieut. P. F. Baer, of Fort Wayne, Ind.; Lieut. F. O. D. Hunter, of Savannah, Ga.; Lieut. W. W. White, of New York, N. Y.; Lieut. C. Jones of San Francisco, Cal.; Captain R. M. Chambers of Memphis, Tenn.; Lieut. Harvey Cook, of Toledo, Ohio; Lieut. Lansing C. Holden, of New York, N. Y.; Lieut. K. H. J. Schoen, of Indianapolis, Ind.; Lieut. W. A. Robertson, of Fort Smith, Ark.; Lieut. Leslie J. Rummell, of Newark N. J.; Lieut. L. A. Hamilton, of Burlington, Vt.; Lieut. J. O. Creech, of Washington, D. C.; Lieut. Howard Burdick, of Brooklyn, N. Y.; Lieut. C. L. Bissel, of Kane, Penna.; Major Harold E. Hartney, of Saskatoon, Canada; Captain Douglas Campbell, of Mount Hamilton, Cal.; Captain J. C. Vasconcelles, Denver, Colo.; Captain Edgar Tobin, San Antonio, Texas; Lieut. E. P. Curtis, Rochester, N. Y.; Lieut. Sumner Sewell; Lieut. R. A. O'Neill, Nogales Ariz.; Lieut. Donald Hudson, of Kansas City, Mo.; Lieut. M. K. Guthrie, of Mobile, Alabama; Lieut. W. H. Stovall, Stovall, Miss.; Lieut. J. D. Deane, Concord, Mass.; Lieut. A. R. Brooks, Framingham, Mass.; Lieut. R. O. Lindsay Madison, N. C.; Lieut. M. Stenseth, of Twin Valley, Minn.; Lieut F. K. Hays, Chicago, Ill.; Lieut. H. C. Klotts; Lieut. Colonel William Thaw, of Pittsburgh, Penna.; Major D. M. Peterson, of Honesdale, Penna.; Captain H. R. Buckley, Agawam, Mass.; Major C. J. Biddle, Philadelphia, Penna.; Lieut. J. Knowles, Cambridge, Mass.; Lieut. J. A. Healey, Jersey City, N. J.; Lieut. Innis Potter; Lieut. F. M. Symonds, of New York, N. Y.; Lieut. G. W. Furlow, of Manchester, Minn.; Lieut. A. E. Eusterbrook, Fort Flagler, Wash.; Lieut. B. Baucom, Milford, Texas; Lieut. Harold McArthur; Lieut. J. S. Owens, Baltimore, Md.; Lieut. J. E. Wehner, New York, N. Y.; Lieut. J. J. Scenley, Chicago, Ill.; Lieut. E. M. Haight, Astoria, N. Y.; Lieut. H. H. George, Niagara Falls, N. Y.; Lieut. J. O. Donaldson.



THE NEWS OF THE WEEK



Banker Uses Aeroplane

New York, March 14.—The first aerial banking transaction was consummated when Ralph H. Mann, president of the Park Trust Company, of Worcester, Mass., flew from that city to New York in a Curtiss biplane, piloted by Lieutenant Charles S. Jones.

Stops were made at Springfield and New Haven to transact business. Mr. Mann claims to be the first financier to carry on his banking business by aeroplane.

Daniels Says Navy Must Lead Way in Aircraft Development

New York, March 15.—In an interview just prior to his departure for his visit to European capitals Mr. Josephus Daniels, Secretary of the Navy, predicted that our Navy would lead the world in aeronautic development.

"It is our purpose in the Navy to keep not only abreast of aviation in the future, but to lead the way in the development of this new art," said Mr. Daniels. "Under the whip and spur of conditions much was accomplished here. The Liberty motor is the most striking instance. It is still unrivalled in its own field—that of a high power aircraft motor suitable for rapid production in quantity. That was our war problem—production—and we solved it.

"Now, however, with the stress of war behind us, our problem is to advance the science of air navigation, to explore every avenue of possible development, to build better, faster, safer aircraft from year to year, as we build better ships for the Navy. For that purpose we must devote ourselves to orderly experiment in peace times. We must keep in touch constantly with what other nations are doing, profiting by their experience and sharing with them the benefit of our own.

"Admiral Mayo, who is the Navy's representative on the Aircraft Production Board, is already widely experienced in the designing and production of aircraft for our own fleet. He will organize and direct the expanded campaign of aviation experiment on which the Navy is embarking. Abroad Admirals Griffin, Taylor and Earle will have the aid of Captain Craven, fresh from intensive wartime experience with aircraft."

Admiral Taylor Says Navy Will Make Trans-Atlantic Flight Within Month

New York, March 15.—The United States Navy will be ready within a month to commission an aeroplane which, naval experts think, will be able to cross the Atlantic, according to a statement made by Rear Admiral David W. Taylor, in charge of the naval air program. Admiral Taylor also said the Navy Department would not be surprised if a transatlantic flight by dirigible should be attempted before the end of the present week.

"America," Admiral Taylor said, "will be ready in a month to fly across the Atlantic. I do not believe that Great Britain will beat us across; that is, if the attempt is made with heavier-than-air craft. We are under the impression, however, that a dirigible trip will be undertaken, possibly within the coming week.

"The Navy has four boats of the N. C-1 (Naval Curtiss) type and work on these craft, I understand, has been almost completed. It has not yet been decided whether all four will be sent over at the same time, but I believe that when the time comes more than one will start. This will be an insurance against entire failure in the event one or two of the machines break down."

Asked whether the entire flight from Long Island to Ireland would be attempted without a stop, Admiral Taylor said he was not sure. "We may break it into two hops," he said. "This will entail the use of vessels equipped with gasoline, oil and food. Through their wireless mother ships can keep in touch with the flying boats. Although the flying boat may alight only once at sea, it is possible that more than one mother ship could be used."

Aircraft Exhibits to Be Flown Back to Factories

Two Thomas-Morse planes which have been shown here will fly to their home, Ithaca, this week, both carrying newspaper reporters and trying for speed records.

Four Naval Planes Here for Flight Across Ocean

Philadelphia, March 17.—Wings for two of the four seaplanes from the Navy Department will make selection for a flight from America to Europe have been completed and tested at the League Island Navy Yard, and now are being fitted to the airboats for which they were designed.

The seaplanes, which are of gigantic size and the N. C. 1 Naval Curtiss type, are at present at Far Rockaway, New York, and it is expected the Navy Department will announce within a week the date for the proposed flight. That it will be within a month is the declaration of Rear Admiral W. Taylor, in charge of the naval air programme.

The Dayton-Wright De Haviland 4 which has been in the Garden will be installed as a Government exhibit at the Smithsonian Institution. It is the first De Haviland battle plane built in this country and has been flown for 1,000 hours on the front in France.

General Menoher Announces Air Service Plans

New York, March 15.—Major General Charles T. Menoher, newly appointed Director of Air Service, U. S. Army, outlined in a newspaper interview the immediate problems facing the War Department in the development of aviation.

"First of all," he declared, "we shall co-operate to every possible extent in development of commercial aviation. Our future in military aeronautics is intimately bound up with commercial aerial development."

The problems now confronting the War Department, as outlined by the general, are as follows:

1. Establishment of an Academy of Aviation similar to West Point or Annapolis.
2. Placing the air service on a peace footing of about 24,000 men all ranks, with about sixteen flying fields.
3. The question of turning over to the National Guard of the various states surplus aviation material to assist in training pilots, observers and mechanics.
4. Completion of an aerial photographic survey of the United States, and from this the compilation of an aviation blue book similar to the automobile blue book.
5. Formation of aerial traffic rules and regulations.

Regarding the first of these the general said:

"It has not yet been definitely decided whether to establish an academy similar to West Point or to open a school of application for technical students. The department is now studying out a plan of co-operation with universities and colleges to train reserve officer pilots.

"Nothing definite has been decided about the peace footing of the air service, but I think it will be in the neighborhood of 24,000 of all ranks. We shall retain a sufficient number of 'planes adequately to take care of the needs of this force.

"If the legal status allows it, we may turn over to the National Guard units of the various states most of the surplus aeroplanes and other equipment. This could then be used for training military pilots who could be transferred to the army in case of war.

"The present plan is to maintain in the peace time units skeleton squadrons. Certain of them will be more or less complete for tactical purposes, but the others will form a nucleus to be filled in with reserve men in case of war.

"The air service has been engaged in mapping the United States by means of photographical survey. When completed the data obtained will be placed at the disposal of commercial aerial transportation companies. In like manner the army aviation fields will be open to their use wherever it does not interfere with purely military work.

"Commercial aviation is going to come, but perhaps a little more slowly than most enthusiasts think. There is so much to do in providing proper landing fields, licensing pilots and making rules for navigation of the air."

World's Altitude Record Held By United States

New York, N. Y.—According to information received here on March 10, Major R. W. Schroeder of the American Air Service is still holder of the world's altitude record of 28,900. An official test of the altimeter employed by Captain Lang of the Royal Air Force on the recent flight, for which an altitude record of 30,500 feet was claimed, lead to the conclusion that Captain Lang attained an altitude of only 27,000 feet.

Major Schroeder made his flight at Dayton, Ohio, on September 18, 1918.

Record New York to Hampton Roads Flight Made

Three hundred miles in 270 minutes was the record of two navy flying boats that made the trip on March 12 between Hampton Roads, Va., and the Naval Air Station at Rockaway Point. The figures set a new non-stop record for this type of flying boat.

The machines left Hampton Roads at 10 A. M. They passed over Atlantic City at 12:30 and landed at Rockaway Point at 2:30 P. M.

Ensign Southers, pilot of the first seaplane, carried Lieutenant Richardson, who took pictures on the flight, and four passengers. Ensign Irvine, in the second flyer, also had five men with him.

The flight was made to test the long distance carrying capacity of this type of craft. If naval officers consider it successful, it is possible that one of the design will be groomed for the Atlantic trip.

A model of the F-5-L type, to which the new record makers belong, is on exhibition at the Aeronautical Exposition. It has a wing span of 103 feet and is driven by two twelve-cylinder Liberty engines. Its total weight is 13,000 pounds with full military load and full gasoline tanks. It carries fuel for eight hours' flying.

Department Store Uses Aerial Delivery

New York, N. Y.—Aeroplane delivery of merchandise was introduced to New York on March 12, when a consignment of goods by the Lord & Taylor Company was sent from the store's substation at Garden City to the home of C. R. Shipley, of Mount Vernon, N. Y., in less than an hour. The load carried weighed 250 pounds.

The merchandise was carried in a Curtiss biplane, J. N. 4, with a K-6 motor. Roland Rohlfs, experimental pilot for the Curtiss company, operated it. He left Garden City at twenty-five minutes after ten o'clock in the morning and landed at the golf course at Pelham Bay thirty-five minutes later.

The load included a bungalow bed, large rug, floor lamp, carpet sweeper, a tabouret, percolator, three pillows, fireless cooker, curtains and draperies, two dozen napkins, tablecloths and towels.

The K-6 motor and a duplicate set of the merchandise purchased by Mr. Shipley are on exhibition in a show window of Lord & Taylor's, Fifth Avenue and Thirty-eighth Street.



Loading the Curtiss Biplane, which transported household utensils from Lord & Taylor's Department Store in New York City to Mount Vernon, N. Y.

Aerostatic Investigators Return

P. W. Litchfield, vice president and factory manager of the Goodyear Tire and Rubber Company, of Akron, Ohio, has returned from Europe after having spent two months abroad.

Mr. Litchfield, together with Ralph Upson, the famous Goodyear balloon expert, and Clifford Slusser, the efficiency manager of the Goodyear factories at Akron, formed the civilian part of a military committee sent to Europe by the Navy Department to study airship conditions in the allied countries at the time of the signing of the armistice.

This duty took the Goodyear officials to England, France and Italy, where they visited and inspected every construction plant, balloon factory and flying field in those countries, and gathered an extensive amount of data which has been incorporated into a report that has just been submitted to the Navy Department, together with various recommendations and observations on the future of the government's airship policy.

During his visit abroad Mr. Litchfield was authorized by the War Industries Board at Washington to make a study of the performance, operation and repair work on automobile tires in the foreign countries visited. The report which the official submitted on these subjects will be used by the Government in analyzing tire conditions as related to the military service.

Spokane Establishing Free Aerial Landing Place

Spokane, Wash.—As a result of the work of the Aero Club of the Northwest, there is being established an aerial landing field, consisting of 400 acres of park land, for the free use of passenger, mail and express planes. An aeroplane repair shop and flying school will be conducted at the field.

The Yakima Commercial Club of Yakima, Washington, has selected two landing places which require little expense to make first-class aerodromes.

The Centralia Chamber of Commerce, Centralia, Washington, has designated a site, which has been pronounced by aviators as superior to some of the government training fields, as an aerial landing place.

Airline to Catalina Island

Los Angeles.—On his return from a recent trip of inspection to Catalina Island, his new purchase, William Wrigley, Jr., stated that an aerial line of transportation for passengers between the island and the mainland is one of the plans under consideration by the new officials of the Santa Catalina Island Company.

Mr. Wrigley stated that he had already been approached by two aeroplane companies for the rights to establish an airline between Los Angeles and Catalina Island.

Naval Aerial Ambulance Demonstrated

New York, March 11.—In order to demonstrate the practicability of the aerial ambulance a naval flying boat was used to carry Lieutenant David Gray, U. S. N., from Rockaway, New York, to St. Luke's Hospital in New York City. Lieutenant Gray, wounded in both legs and one arm, was in the charge of Major Helen Bastedo of the Motor Corps of America, and the journey, including transfer by dory from the Hudson River at 96th Street to an ambulance on shore, and thence to the hospital at 113th Street, required only 48½ minutes.

Bureau of Mines Announced New Aircraft Fuel

Washington, D. C., March 12.—Development, too late for use in the war, of a motor fuel which adds ten miles an hour to the speed of aeroplanes and has possibilities for use in automobile racing was announced to-day by the Bureau of Mines. The liquid, a combination of benzol and cyclohexane, called hectar, costs about $1 a gallon, so while of military value it is not regarded as practical for commercial purposes at present.

Another combination developed by the bureau, consisting of benzol and gasoline, which has been found to be more powerful than gasoline alone, is expected to prove of value in industry.

Aeronautics as Part of College Courses

The Division of Military Aeronautics, in cooperation with the Committee on Education and Special Training of the General Staff, has arranged a training program for college students which will not interfere with their prescribed college courses, but which will, at the end of three years, turn out men prepared for commercial or for military aviation.

In view of the depreciation among our reserve officers of not less than ten per cent. a year, it is estimated that the Air Service must draw from some source about 1,000 pilots, 650 aeroplane and balloon observers, and 100 engineer officers every year. West Point, essentially military schools, and the ranks can be drawn upon only to fill up the regular establishment. Therefore the machinery of the Reserve Officers' Training Corps, as established by General Order No. 49, 1916 (W. D.), and now in process of modification, was chosen as most likely to bring about desired results.

"In outline the plan is to give the equivalent of the work formerly done in the ground schools exclusive of military practice—that is, aeroplanes, engines, gunnery, navigation and maps, infantry and artillery co-operation, and signaling—at the colleges and universities during the college year and give flying and military training during the six weeks summer camps held at northern flying fields. It is estimated that three summer camps will be required to qualify for pilot."

"Aerial Taxis"

The first aerial taxi depot in the world will be established within the next two months at Garden City, Long Island, according to Glenn H. Curtiss at the Aero Show.

Mr. Curtiss said: "We shall have a taxi depot which will furnish small machines for short inter-city travel, anything less than 200 miles, on order. Experienced pilots will be available to drive these aeroplanes, and the total cost will be surprisingly reasonable. It certainly will not exceed that of many an automobile trip, for we save on the pilot's and the ship's time, even if we may have a larger running cost to meet."

War Risk Insurance—Non-Delivery of Insurance Certificates

The Bureau of War Risk Insurance announces that a large number of insurance certificates remain undelivered. This is due to insufficient or no address having been given in some cases, while in many others the address of the beneficiary has changed and the certificate has been returned.

All officers and enlisted men whose insurance certificates have not been received either by themselves or by their beneficiaries should write to the Insurance Division, Bureau of War Risk Insurance, Treasury Department, Washington, D. C., stating the following:

a. Full name.
b. Rank and organization at the time of application for insurance.
c. Army serial number.
d. Present address.
e. Name and address of the beneficiary, if it is desired that the certificate be sent to the beneficiary.
f. If it is not desired that the certificate be sent to the beneficiary, instructions will be given as to what disposition is to be made of it.

Certificates will in no case be sent for file to the Adjutant General of the Army.

Permanent Exhibit of Aircraft

It was announced at the Aeronautical Exposition that a number of the exhibits now on display there will be sent to Washington after the close of the show to become the nucleus of a permanent exposition at the United States National Museum.

Under direction of Dr. Charles D. Walcott, Secretary of the Smithsonian Institution, plans for a permanent War Exposition in Washington have been under way for some time, and are now definitely arranged. Dr. Walcott, a member of the National Advisory Committee for Aeronautics, is particularly interested in aviation and has been since the days of Langley, who was himself at one time Secretary of the Smithsonian. Consequently a large part of the War Exhibition will be the development of the science of aeronautics and include many American and European examples of aeroplanes and accessories.



The Bristol All Metal Machine, manufactured by the Bristol Aeroplane Co. of England. It is equipped with a Hispano-Suiza engine

Navy Department Issues Statement on Helium Development

Washington, D. C., March 20.—The Navy Department issued a statement relative to the development of helium gas, charging the Bureau of Mines with abandoning this work before the solution of the problem.

The Navy Department statement says:

"During the experimental period of this work the Bureau of Mines, assuming that the plants designed by the organization would be in successful operation, advised that the experimental work on the two commercial plants should be stopped. The War and Navy Departments and particularly the Navay Bureau of Steam Engineering, which was concerned with the production of helium, insisted on the contrary upon a continuation of the experimentation of these plants. Their judgment was vindicated within a few weeks when it as shown that helium could be produced in quantity at a reasonable price at both these plants."

To this statement, Director Van H. Manning, of the Bureau of Mines, replied that the Navy Department was attempting to obtain credit for developing helium. The discovery of helium in Kansas, Oklahoma and Texas is said to be due to the work of the Bureau of Mines, acting on the suggestion of officials of the British Government. Two large plants are located in Texas producing the gas in quantities.

The process is roughly as follows:

Natural gas is collected and compressed and cooled down in the same kind of apparatus used to liquify air. As the cooling process continues, everything is liquified out long before the helium. The regular hydrocarbon series making up approximately 70 per cent of the natural gas liquefies first and then the nitrogen, constituting about 30 per cent, is condensed at a temperature of 195 degrees C below zero. It requires 268 degrees C below ordinary zero to liquify helium, so this gas remains to be collected when other elements have been liquified.

Assistant Secretary of the Navy Franklin D. Roosevelt stated that the only means of bringing down a helium filled dirigible would be for an aeroplane to crash its way bodily through it. He further stated that:

"If the war had lasted until next spring the British and American Governments would have sent helium filled airships over strategic points in Germany, each capable of dropping a total of ten tons or more of high explosives either in a single tremendous discharge or in a number of smaller ones during its passage over a fortress or city. These airships would have carried batteries amply sufficient to repel aeroplane attack."

Elaborate Decorations at the Aircraft Show

New York.—A feature of the Aeronautical Exposition held at Madison Square Garden and the 69th Regiment Armory from March 1 to 15 were the unique and elaborate decorations, which were carried out in accordance with the suggestions of Mr. Fay L. Faurote, of the Aircraft Manufacturers' Association, by artists Gates and Morange, famous scenery painters.

The plan was to convert the entire walls and ceiling of the Garden into a vast outdoor panorama. At the western end of the building rose a mountain lodge, and before it stretched a vista of valley, peak and ocean. A continuous effect of landscape and sky was achieved from the floor to the ceiling, and the ceiling itself, covered with a mesh of blue gauze, completed the illusion of space which the canvasses covering the walls had begun.

This permitted the aeroplanes and balloons to repose on a landing field represented by the Garden floor. The accessories were placed on the balcony, but the scenic walls consisted of foreground and background, and the foreground, cliffs or rolling hills, rose in front of the balcony and above it, hiding the exhibits there and blending with the sky or peaks which lay beyond, running from the balcony to the arch of the ceiling. Four stairways at different parts of the hall led to the accessory exhibits.

The Alpine lodge at the western end of the Garden fronted a view of the Atlantic at the eastern end. On the surface of the ocean lay the transports which carried the American doughboys to France and their guardians, the American battleships.

On the northern wall Alaskan peaks lay in the background, and in the foreground shone the red, orange and white of Colorado canyon cliffs. On the opposite side rolling hills and nestling valleys represented farmland and grazing country.

To Maintain 22 Fields for Aircraft

Washington, March 13.—The War Department has arranged to maintain twelve temporary flying fields, which will be used for storage purposes, four permanent balloon fields and four permanent training fields, and at least two experimental fields.

The first intention to retain only two training fields was abandoned when this number was found insufficeient, and in consequence Arlington Field, Houston, Tex.; Post Field, Ft. Sill, Okla.; Kelly Field, San Antonio; Rockwell Field, San Diego, Cal., have been chosen as the permanent training fields.

The twelve fields to be maintained for storage purposes have not yet been definitely named. The War Department believes it can store its hundreds of elementary and advanced training planes for a period of years without deterioration. Langley Field will be retained as one of the experimental fields; McCook Field will be given up, as the city of Dayton wants this property back. Wilbur Wright Field, which has been suggested as an experimental field, will not be used, because of the possibility of floods.

The Air Service would like to purchase the Dayton-Wright plant and use it for its main experimental depot. The Dayton-Wright equipment includes an excellent experimental field and a number of structures, including buildings as large as 1,000 x 300 ft., and is considered by the Air Service as especially suitable for experimental work. If this plant can be purchased, the Air Service will move its present repairship from Indianapolis to Dayton. The Government already has a large financial interest in Dayton-Wright, due to war financing, and the balance of the purchase price would consequently be insignificant. In the event that the purchase of the Dayton-Wright plant cannot be consummated, some other site in the Middle West close to the aeroplane and engine factories will be selected.

Brooklyn Building to Have Landing Place On Roof

Brooklyn, N. Y., March 17.—The Gibbons Company, builders, have announced that the new building for which they are just breaking the ground will have an aerial landing place on its top. It is to be five stories high and will have a frontage of 175 feet. Tenants of the building will have extended to them the privilege of using the landing place for commercial aerial delivery.

Aviation to Come to Its Own as International Sport

New York, March 17.—Lieutenant J. O. Donaldson, a flying officer with eight German machines to his credit, who was captured but escaped to Holland, in an interview upon his return from overseas, predicted that interest in international aviation meets would exceed that of any other international sport. Automobiles, motorboats and yacht races will make way in the popular interest for the international aviation meets, with its seaplane and aeroplane races and thrilling acrobatics. The recent speed and looping records, which have each been broken several times in the past few weeks, foreshadow the great interest which will be centered about aeronautic achievements.

New York Aerial Police Field Selected

New York, March 17.—Inspector John F. Dwyer, of the New York Police Department, announced that the old reservoir in Central Park will be drained to provide a landing place for the use of the New York Police Force. The Inspector is quoted as stating that fifteen fliers have already been enlisted in the Aeronautic Branch of the Police Department. Filled-in ground along the Hudson River near west Eighty-sixth Street will be used for hangars.

Daniels Talks by Radio with Seaplane 150 Miles Away

Seated at his desk in his office in the State, War and Navy Building, Secretary Daniels this morning talked by radio 'phone to the pilot of a seaplane in flight approximately a hundred and fifty miles from Washington. The Secretary asked questions and received replies from Ensign Harry Sadenwater, who was piloting the seaplane, the last remark "caught" by the Secretary being the Ensign's statement that he was then about a hundred and fifty miles away. The test was made with a seaplane on a flight from the capital to Hampton Roads.

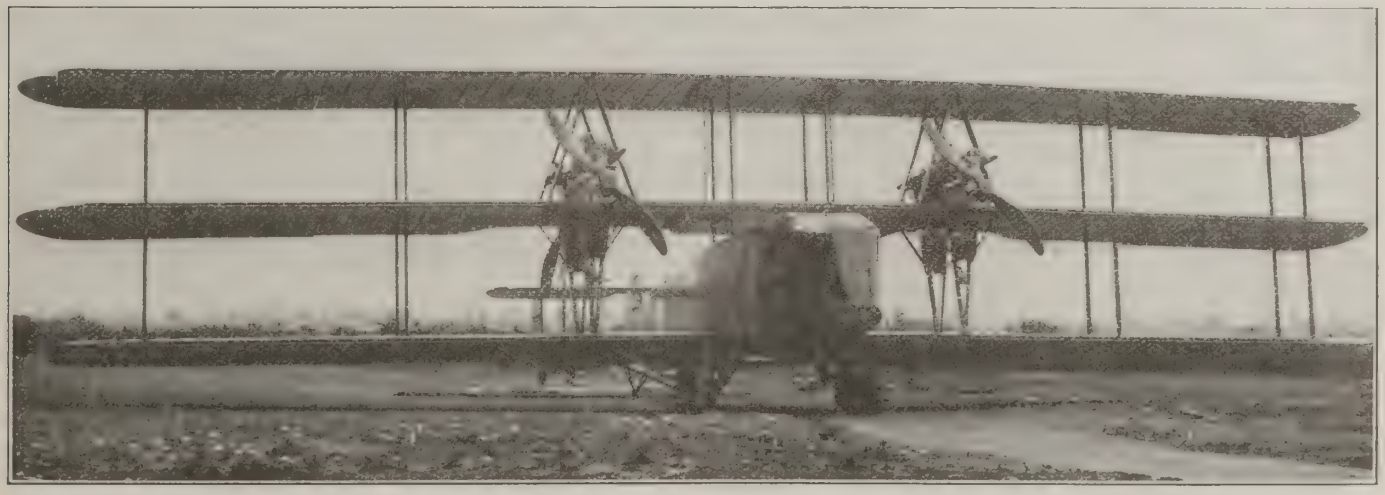
This is believed to be the first time that telephonic communication with aeroplanes at such long range has been accomplished, although communication at short distances and in formation has been carried on in the past.

A further interesting detail in connection with this communication is that any commercial telephone may be used, not only for transmission, but also for reception from the seaplane. Heretofore it has usually been necessary for officials who desired to communicate with aeroplanes in flight to be with the apparatus at the radio station itself, and this is the realization of the commanding officers being personally in touch with seaplanes on long distance patrol at sea.

The apparatus used was the Secretary's commercial desk telephone connected through the Navy Department central and the Navy Yard exchange in the usual manner and a standard air station telephone transmitter located in the Navy Yard. The apparatus at the Navy Yard was designed by the General Electric Company under the direction of the Bureau of Steam Engineering, from which was radiated 10 amperes in the antenna. This is the largest tube transmitter which has been designed for commercial use in the United States.

The apparatus on the seaplane is the largest telephone transmitter in use in any aviation service and is at light in weight as many other designs of much smaller power. The receiving apparatus used in the plane and in the receiving station at the yard was designed and manufactured at the Navy Yard under the direction of the Bureau.

The personnel of the General Electric Company included E. P. Edwards and E. M. Kinney. The personnel of the Navy Department involved in the design and use of this method of communication was Admiral Griffin, Chief of the Bureau of Steam Engineering, and Commander S. C. Hooper, head of the Radio Division, and assisted by Lieutenant Commander R. A. Lavender and T. Johnson, Jr., expert radio aide.



The Bristol Type Braemar Triplane Bomber with 4 Puma Engines

The AIRCRAFT TRADE REVIEW

Aeromarine on Pre-War Basis

Keyport, N.J.—The Aeromarine Plane and Motor Company has got back into production on a pre-war basis and has reduced its working force. The construction of the 1-story building, 60 x 100 ft., for the New Jersey Motor Sales Company, which builds engines used by the Aeromarine company, has been resumed.

Small Curtiss Training Plane Makes Long Flight

New York, March 14.—Flying a small Curtiss JN training plane which has had more than three thousand hours in the air, Carl Batts made a 350 mile flight from Newport News to New York in a flying time of five hours and fifty minutes. This machine has been serving as a training plane since April, 1917.

In order to save time, it was necessary to fly straight over Chesapeake Bay, a distance of twenty miles. The Curtiss JN machine, not being a seaplane, is not intended for over-water flying, but it successfully negotiated this jump and another one of similar length over Delaware Bay. Two landings were made, one at Pocomoke, Md., and another near Atlantic City, N. J. A severe storm was encountered in flying over New York Harbor, and upon examining the fuel supply after landing, Mr. Batts found that not a drop of gasoline remained in the tank.

In view of the long service which the particular plane used has seen and the fact that no special preparations were made for the flight, it serves as an example of the reliability and endurance of modern aircraft.

Personal Pars

A. Ludlow Clayden has resigned as consulting engineer for the Wright-Martin Company. He will establish a consulting engineering business in London and will specialize on the investigation of European propositions for American manufacturers. Mr. Clayden spent most of 1918 in Europe, studying methods of manufacture of the Hispano-Suiza motors.

Neil MacCoull, contributing technical editor to Aerial Age, has returned from duty in France with the Naval Air Forces, and is now connected with the Texas Company as Automotive Engineer in the Sales Department with headquarters in New York. Prior to enlistment, he was a mechanical engineer in the machine works of the Westinghouse Electric and Manufacturing Company, of Pittsburgh, Pa.

Officials Undecided About Status of Self-Imported Aeroplane

Washington.—Customs authorities have encountered the first case of an aeroplane imported into the United States under its own motive power. An American bought a Canadian plane, and it was flown across the border near Detroit.

The question then arose as to whether it was dutiable, since aeroplanes are not mentioned in any tariff acts. Customs officials finally decided that if it remains permanently in the United States it should be taxed as a "manufactured article" at the rate of 20 per cent, but if it flies out of the country again within six months it will be regarded as "on a tour" and will not be taxed.

3,018 American Aeroplanes In Europe On November 11

The A. E. F. had 3,018 planes equipped with Liberty motors at the front when the armistice was signed, according to Major R. J. Bates, Signal Corps, who arrived recently from France.

Major Bates, who flew the first American aeroplane at the front, said Liberty motors were being assembled, tested and turned over for action at the rate of forty a day on November 11.

Fishermen to Use Aeroplanes

Hugh M. Smith, of Washington, D. C., Commissioner for the Bureau of Fisheries, has indorsed the plan presented by the Gloucester Board of Trade of Massachusetts to have several seaplanes as scouts to accompany the fishing fleet of 35 to 40 mackerel boats that starts for the fishing grounds about the middle of April.

It was pointed out that the scouting experiment should be under the direction of a practical purse-seiner fisherman of experience who is versed in identifying fish schools and estimating their size.



Julius M. Meirick

Julius M. Meirick, Superintendent of Publicity, Standard Aircraft Corporation, Elizabeth, N. J., has been one of the "strong men" of that organization. Of tireless energy and forceful demeanor, he made an important impression on the company's activities.

In addition to his being in charge of a large photographic department, which throughout the war turned out hundreds of thousands of pictures, showing every phase of Standard's activities, Mr. Meirick, in his publicity work, unquestionably made Standard one of the best known corporations in America. It has been said that he obtained more free space for his company than has been obtained by any institution anywhere, except the United States Government in its various campaigns.

The publicity accorded the Standard Corporation on Langley Day, Saturday, July 6, 1918, has set the pace for work of this kind. Practically every newspaper in the country carried front-page messages about that event and for months after it was still going the rounds of the various magazines not only in English but in all the foreign languages published in America. Foreign publications also devoted considerable space to this and other Standard activities.

Throughout 1918 Mr. Meirick handled the various Liberty Loan and similar campaigns in the various Standard plants and achieved a phenomenal result in every campaign. Not only was the 100 per cent. flag secured in every case but the per capita record of individual subscriptions is the greatest of any industrial corporation in the country.

His previous training of twenty-five years at the head of his own organization has certainly been a great factor in his new field of endeavor and unquestionably he has given a wonderful account of himself.

Mr. Meirick is recognized as a versatile writer and lecturer, a man of broad vision, and he has an abiding faith in the future of aeronautics. In a recent interview he stated: "So sure am I of the successful future of aviation that I am perfectly willing to devote my entire future towards its upbuilding and growth. Now that man has attained supremacy in the third element of possible transportation, there can be no going backward. Onward, upward and forward must be the 'obiter dictum' and aeroplane makers of broad vision, backed by substantial organizations, must achieve financial gain, glory and fame."

In 1898 Mr. Meirick gave up his business to enlist in the Spanish-American War, being one of the first to volunteer, on April 29. He was mustered out with his regiment in December of that year.

He was for twenty years proprietor of the Commercial Photo Company of Newark, N. J., with branches through the country. This organization achieved great distinction as catalog builders, publicity promoters and sales engineers. He was also interested in many other commercial and civic ventures.

He is a member of the Aero Club of America, City Club of New York, Kiwanis Club of Newark, N. J., and other organizations.

He is now forty-two years old.

Personal Pars

Charles Freosch has resigned as aeronautical mechanical engineer for the Government and is now designing engineer for the Fergus Motors of America, Newark, N. J.

Aero Club of Pennsylvania Urges Municipal Aerodrome

The Aero Club of Pennsylvania will go before Councils to urge a municipal aerodrome for this city. The decision was taken last night at the monthly meeting of the organization in the Bellevue-Stratford.

Lieutenant Ralph T. Folwell, of the naval aviation corps, read a report on available landing fields in and near Philadelphia. He mentioned one near the Sixty-ninth Street elevated railroad station, measuring 145 acres, and for which the owner, P. G. Lawler, of Bala, asks $145,000. The second is at Van Kirk street and the Second street pike, embracing 5,000 acres, for which no price has as yet been set. The third is a fifty-seven-acre tract of land near the Sixty-ninth street elevated station, owned by George A. Drovan, and valued at $164,000. It was also suggested that the city might give the field from Thirty-third street to the Schuylkill River and from the East Park river drive to the river for the purpose.

The reason for the move, Lieutenant Folwell explained, is that it is estimated 100,000 aviators will return to this country who will desire to remain in flying activities.

To Store Unused Army Planes

Washington, D. C., March 12.—Acting Secretary of War Crowell announced the decision of the War Department on March 12 to store for possible future use the hundreds of elementary and advanced training planes used during the war at the sixteen flying fields and three balloon fields, which are to remain in the hands of the War Department as inactive and reserve aviation fields.

Fields to be retained and now leased will be purchased by the Government. Actual instruction in flying will be conducted at only two fields. The fields to be retained have not yet been decided, but the Secretary said that two would be near Newport News, three on the Pacific Coast, one near New York, three in Texas, two in Florida, one in Mississippi, one on the Great Lakes, and one each in Georgia and Oklahoma.

The War Department, however, is planning an advertising campaign to dispose of material, finished parts and special tools designed for the aircraft program. It is understood that no complete Liberty motors or planes are to be sold under this plan. Detailed announcement regarding the disposal of parts and materials is expected at an early date.

Zenith Equipment on Record Packard

V. R. Heftler, president of the Zenith Carburetor Company, in speaking of the performance of the Zenith carburetor on the aeroplane-motored Packard in which Ralph De Palma made his mile in 24.04 seconds and smashed all other official speed records at Daytona Beach, said: "The carburetor used by Ralph De Palma was one of our regular commercial duplex models and was supplied from stock. No one realizes better than De Palma the absolute necessity for dependable carburetion and he has used the Zenith exclusively on his racing cars for the past three years. The exhaustive tests made by the Liberty aircraft designers before they adopted the Zenith for the Liberty aircraft engine had also placed the stamp of official approval on the soundness of the compound nozzle principle which makes the Zenith automatic in action and eliminates adjustments. Speed contests, as well as the exacting requirements of aviation, are sure to reveal any weaknesses as well as demonstrate the real merit of any essential part of the racing machine or aeroplane."

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service

Louis T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service



PILOTS

Ira O. Biffle
Dana C. DeHart
Edward V. Gardner
Lawton V. Smith
Leon D. Smith
Robert F. Shank
Irving Graeb

John A. Jordan, Superintendent, Western Division
Trent C. Fry, Manager, Belmont Park, L. I.
Charles I. Stanton, Manager, College Park, Md.
John M. Miller, Manager, Bustleton, Pa.
O. J. Sproul, Manager, Chicago, Ill.
C. E. McMillan, Manager, Cleveland, Ohio
August Carlson, Manager, Lehighton, Pa.
Harry F. Powers, Manager, Bellefonte, Pa.
William Lindley, Manager, Clarion, Pa.
J. P. Edwards, Manager, Bryan, Ohio
Charles N. Kight, Special Representative

RESERVE PILOTS

Lester F. Bishop
Dan Davison
C. C. Eversole
E. A. Johnson
D. I. Lamb
Frank McCusker
E. H. Lee
Lyman Doty

CHIEF MECHANICS

Frank Tower
Edward C. Radel
Chas. C. King
H. E. Fremming
Albert Cryder

Aeroplanes to Make Victory Loan Flights

Washington, March 15.—Three flying "circuses" of aviators will tour the United States giving sham battles in the air and performing acrobatics over the principal cities as a feature of the Victory Loan campaign, which opens on April 21.

This announcement was authorized by the Treasury Department. The tour is intended to present the "greatest flying program" ever offered in the United States. The three "circuses" will be composed of American, French and British aviators. They will fly American planes and captured German Fokkers. Frank R. Wilson, Director of Publicity for the loan, will have charge of the aerial tours. The actual flights will be under the direction of the Military Aeronautic Branch of the War Department, with Captain Leon Richardson in charge.

Fourteen German Fokker planes, captured by General Pershing's men, were landed at Newport News, and will be shipped at once to Washington and turned over to the Treasury Department for the loan campaign. All are in flying condition, and will be used in all of the loan demonstrations. The best types of American planes developed during the war will be used to show what has been achieved in American aircraft development.

The country has been divided into three sections for the Victory Loan flights. Eastern, Middle Western, and Western. A squadron made up of American, French and British flyers will tour each of these three districts, beginning April 10. The Eastern tour will begin at Mineola, L. I. The Middle-Western tour will begin at New Orleans, and the far Western tour at San Diego. Each squadron will be carried in a special train of eleven cars, traveling at night. Nine end-door baggage cars will be required to carry the seventeen aeroplanes in each squadron. Each train will be preceded by an officer, who will select landing fields and make arrangements with local Liberty Loan committees for the entertainment of the flyers.

The names of the six British flyers are not known. However, the Government has been informed by Great Britain that six of the best British flyers will be here in time for the tours. Eight French flyers have already left France for the United States. One of the French flyers has a record of forty-three victories over German adversaries. Another made 170 bombing trips over German lines.

Photographers of the Signal Corps will accompany each squadron. They will take photographs of each of the American cities visited, the plates will be dropped from aeroplanes by parachute, and hurried reproductions made for the benefit of the residents of all cities visited.

The general program to be followed in each city visited will be as follows: Two American scout planes will rise to drop Victory Loan literature over the city. Four of the captured German planes will then attack these two American planes. Four American planes will drive off the German planes, and the flyers will give demonstrations of aerial acrobatics. Parades will precede the flights. Citizens will be able to see the planes unloaded and set up in the morning and knocked down again for shipment after the flights.

The schedule follows:

Eastern Squadron—New York, Philadelphia, Washington, D. C.; Richmond, Charleston, Savannah, Jacksonville, Atlanta, Birmingham, Nashville, Louisville, Lexington, Cincinnati, Indianapolis, Toledo, Detroit, Cleveland, Pittsburgh, Buffalo, Rochester, Syracuse and Boston.

Mid-Western Squadron—New Orleans, Jackson, Memphis, Little Rock, St. Louis, Peoria, Chicago, Milwaukee, Duluth, Minneapolis, St. Paul, Sioux City, Omaha, Des Moines, Kansas City, Wichita, Muskogee, Oklahoma City, Dallas.

Western Squadron—Los Angeles, Fresno, San Francisco, Sacramento, Reno, Salt Lake City, Boise, Walla Walla, Portland, Seattle, Yakima, Spokane, Missoula, Butte, Sheridan, Denver, El Paso, Phoenix.

If weather conditions permit and the train reaches Denver on scheduled time, the cities mentioned below may be visited: Pueblo, Trinidad, Santa Fe, and Albuquerque, N. M.

UNITED STATES POST OFFICE AIR MAIL SERVICE

Monthly Report of Operation and Maintenance

JANUARY, 1919

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone, and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND UNIT COST					
													Gallon of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
														hr. min.				
2	$70.21	$30.94	$61.94	$79.98	$55.59	$136.12	$135.84	$382.14	$29.95	$97.34	$140.15	$1,220.20	231	11 48	872	3.77	$103.40	$1.3993
3	177.25	69.88	61.94	79.98	55.59	136.12	386.40	473.05	40.00	97.34	140.15	1,717.70	582	33 34	2407	4.14	51.17	.7136
4	17.93	9.12	29.12	79.98	14.88	136.12	.....	281.41	63.52	97.34	140.16	869.58	59	.....	.....	.....	.....	.....
38262	109.38	43.46	61.94	79.98	55.59	136.12	232.70	303.20	100.10	97.33	140.16	1,359.96	359	20 13	1664	4.64	67.27	.8172
38274	17.89	6.08	41.94	79.98	26.07	136.12	22.11	291.47	29.95	97.33	140.16	889.10	59	1 55	128	2.17	463.88	6.9460
38275	101.12	42.91	61.94	79.98	55.59	136.12	340.35	306.77	6.00	97.33	140.16	1,368.27	333	29 34	1706	5.12	46.27	.8020
38278	86.10	25.72	61.94	79.99	55.59	136.13	155.25	283.96	29.00	97.33	140.16	1,151.17	282	13 29	899	3.19	85.37	1.2805
38279	60.09	33.41	61.94	79.99	55.59	136.13	196.65	244.40	.....	97.33	140.16	1,105.69	198	17 05	1157	5.84	64.49	.9521
39362	105.97	24.58	61.94	79.99	55.59	136.13	69.88	335.68	31.10	97.33	140.16	1,138.35	350	6 04	536	1.53	187.64	2.1237
39363	35.40	4.86	12.82	79.99	11.19	136.13	.....	40.24	.....	97.33	140.16	558.12	118	.....	.....	.....	.....	.....
39364	87.92	38.88	61.94	79.99	55.59	136.13	183.42	236.22	108.40	97.33	140.16	1,225.98	337	15 56	1205	3.58	76.94	1.0174
39365	84.44	18.59	61.94	79.99	55.59	136.13	77.40	355.93	29.96	97.33	140.16	1,137.46	276	6 43	564	2.04	169.34	2.0167
Total....	$953.70	$348.43	$641.34	$959.82	$552.45	$1,633.50	$1,800.00	$3,534.47	$467.98	$1,167.99	$1,681.90	$13,741.58	3184	156 21	11138	3.50	$87.89	$1.2337

Cost per mile, overhead, $.4492; cost per mile, flying, $.2785; cost per mile, maintenance, $.5060.

OTTO PRAEGER, Second Assistant Postmaster General.



THE "NC-1" NAVAL FLYING BOAT

THE N C-1 Naval Flying Boat, built by the Curtiss Engineering Corporation at Garden City, L. I., was designed by the Bureau of Construction and Repair, under the direction of Naval Constructors Hunsacker, Richardson and Westervelt. It is one of the largest boats ever built and on November 8, 1918, flew with fifteen people from Long Island to Washington, D. C., and thence to Hampton Roads, Va. A world's record for passenger carrying was established when a flight was made on November 27 with 51 people aboard. On these flights the boat was flown by Lieutenant David H. McCullough, U. S. N.

The usual crew is composed of five officers and two enlisted men. Two pilots sit side by side in the central nacelle aft of the engine. Dual controls are installed. A machine gunner is placed at the bow of the hull and another gunner in a turret built into the top wing, and reached by way of a ladder which runs up through the pilot's nacelle from the boat hull.

The fuel tanks contain 300 gallons of gasoline, sufficient for a flight lasting about 13 hours.

General Dimensions

Span, upper plane	126′ 0″
Span, lower plane	96′ 0″
Chord, both planes	12′ 0″
Gap between planes	12′ 0″
Overall length	70′ 0″
Overall height	25′ 0″

Weights

Net weight	13,000 lbs.
Gross weight (fully loaded)	22,000 lbs.
Useful load	4½ tons

Performances

Maximum speed	80 M.P.H.
Climb in ten minutes	2,000 feet
Maximum range of endurance	13 hours

Main Planes

Incidence angle of both planes.....3°

Main planes are in 7 sections. Upper plane in 3 sections. Center section 25′ 4″ in span. Outer sections 44′ 4″.

Lower plane in 4 sections; extensions from either side of the hull are 10′ 8″ in span; outer sections 35′ 4″.

There is a clearance of ¼″ between all plane sections.

Outer lower sections have a 3-degree dihedral. All other plane sections are in a flat span.

Interplane struts above the hull are spaced 50¾″ apart. Between these struts at a height of 6′ 10 3/16″ from the lower front wing beam is the center nacelle which carries the engine and the pilot's compartment. Outer motor nacelles are centered 11′ from the center of the machine. The interplane struts carrying them are spaced 3′ 31¼″ apart.

Center sections of the main plane terminate 4⅛″ beyond the outer nacelle carrying struts. Another set of interplane struts are located 26′ 11″ from the center line of machine. From these the outer struts are centered 14′ 7″, leaving an overhang on the upper plane of 15′ 6″ and of 6′ 6″ on the lower plane.

Ailerons attached to the upper plane are 36′ 6½″ long and have a chord of 43″; ends are balanced. At the balanced portion the chord is 6′ 1⅜″ and the balanced portion extends 6′ beyond the end of rear main wing beam. There is a clearance of ¾″ between inner ends of ailerons and the main plane.

The main planes have a chord of 12′. Forward main wing beam centered 16½″ from leading edge; beams centered 84″ apart; trailing edge 43½″ from center line of rear beam.

Gap between planes, 13′ 6⅛″. Because of the dihedral of the lower plane, the gap decreases to 12′ at the outer strut. Lower wing beam is centered 5⅛″ below top deck of the hull.

Hull

The overall length of the hull is 44′ 8¾″. The step is located 27′ 8¾″ from the nose. Maximum width of hull is 10′; maximum depth, 7′ 5⅝″. Leading edge of upper main plane located 18′ 2″ from nose.

Tail Group

The tail is of the biplane type. It is carried on three hollow spruce outriggers. Elevator hinges are located 34′ 8 3/16″ from the trailing edge of the upper main plane. Gap between tail planes, 9′ 3″. The lower tail plane is located 10′ 11″ above lowest point of the hull. Span of the upper tail plane is 47′ 11″, including ailerons. The ailerons extend 41″ beyond ends of the planes. The span of the lower stabilizer plane is 26′ at the ailerons. Balanced portion of ailerons extends 37″ beyond ends of lower stabilizer plane. The chord of the balanced portion of both ailerons is 55″.

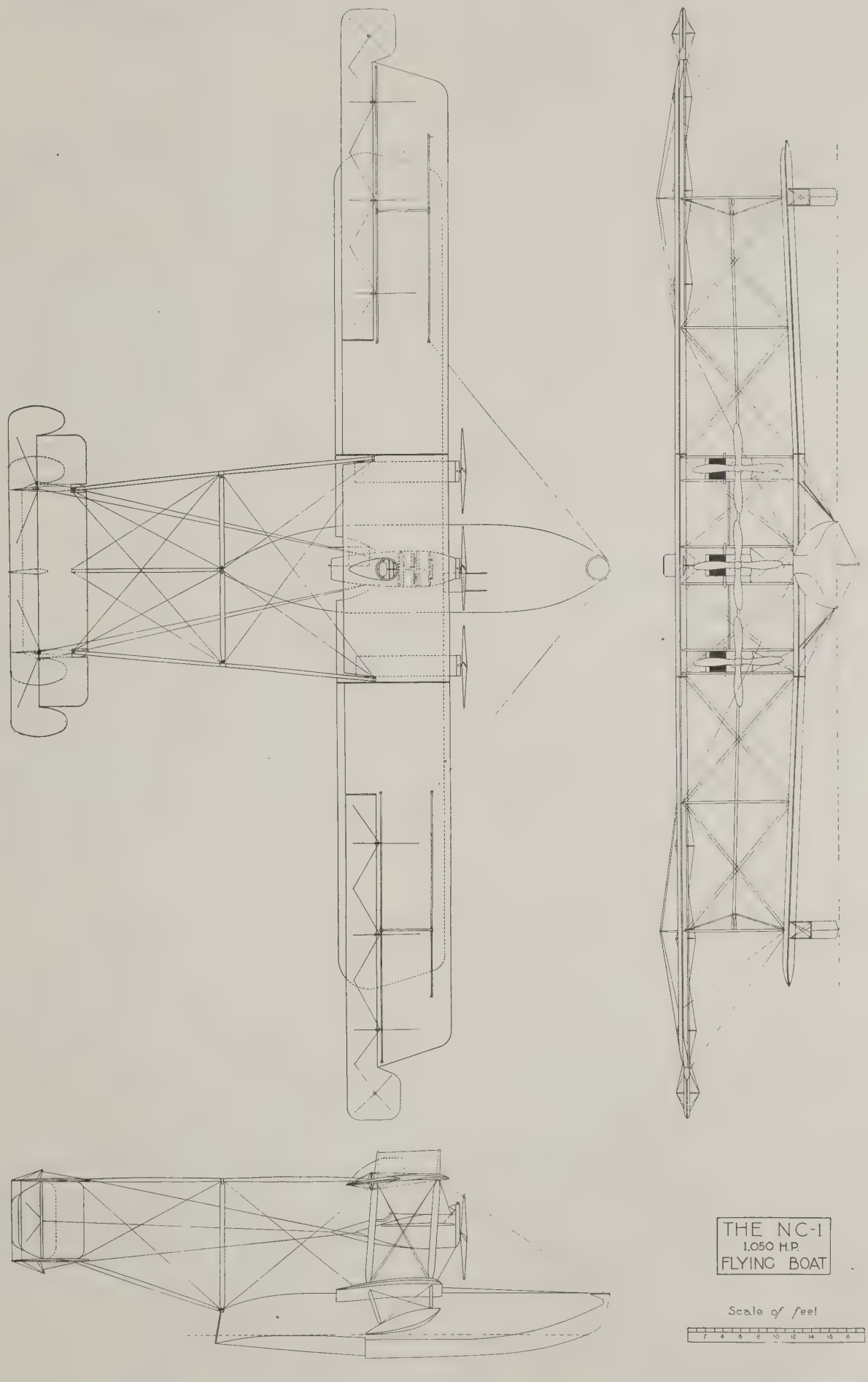
There are three rudders and two fins. The center rudder is balanced and the outer rudders are hinged to the vertical fins.

Engine Group

Three Liberty engines are carried in nacelles between the planes. The engines, low compression Navy type, each develop about 350 H.P. Four-bladed tractor propellers are used, 10′ 10″ in diameter. A clearance of 12″ is allowed between tips of central propeller and tips of adjacent propellers.



The NC-1 Flying Boat, which will probably attempt the Trans-Atlantic flight


THE NC-1
1.050 H.P.
FLYING BOAT
Scale of feet
McLaughlin

A SIMPLE BENDING ALLOWANCE CHART FOR SHEET METAL

By E. S. Bradfield, Formerly of the Engineering Department of the Naval Aircraft Factory

ONE of the commonest errors on aeroplane fitting drawings are the bending allowances on flat patterns. In most cases the bends are 90 degrees, and the bending allowance is the distance on the neutral axis of the metal, beginning at the point of bend and measured to the end of the bend.

At the bottom of the chart are the thickness of the metal, both in B. W. G. and fractions of an inch. On the right-hand side is the inside radius around which the bend is made, in fractions of an inch. On the left side is the bending allowance in fractions of an inch. It is usual practice to give all measurements on flat patterns in fractions, and down to a sixty-fourth of an inch.

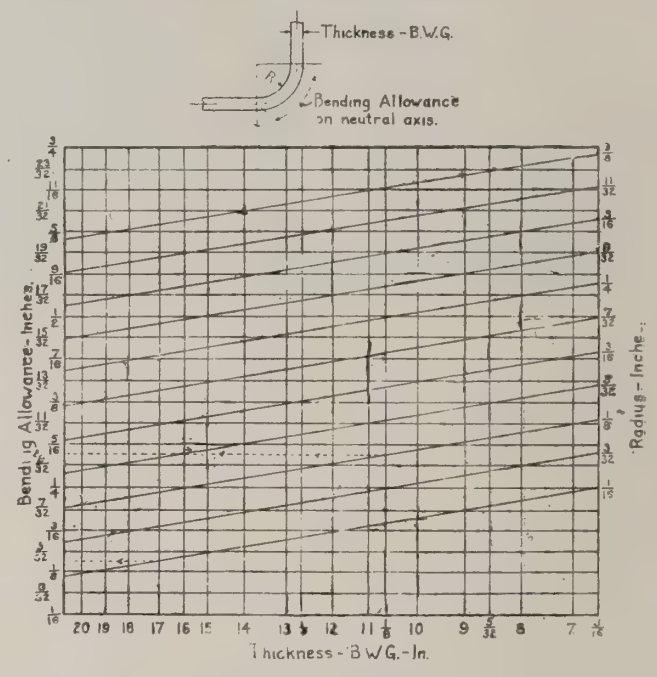
If, for instance, it is desired to find the bending allowance for 17 B. W. G. metal around a sixteenth of an inch radius, with a ninety-degree bend, we go up the line from 17 until it intersects the 1/16" radius line, and from that point draw a line to the right side of the chart, where we find it is midway between 1/8" and 5/32" or 9/64" is the bending allowance.

The formulæ on which this chart is based is that,

$$B.A. = \frac{pi}{2}(R + \frac{t}{2})$$

$$= \frac{pi}{2}R + \frac{pi}{2} \times \frac{t}{2}$$

From which it will be seen that for a given radius, B. A. is equal to a constant plus a variable which varies directly with t. And by calculating this for different radius and thickness, and plotting same, this chart was obtained.



BENDING ALLOWANCE CHART.

DIMENSIONS OF STEEL TUBE STRUTS

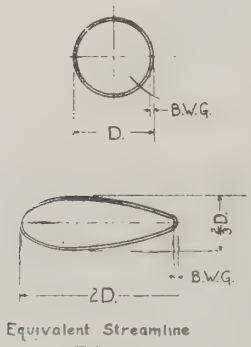
By E. S. Bradfield, Formerly of the Engineering Department of the Naval Aircraft Factory

THIS chart was prepared from a similar chart that appeared in the trade papers several months ago, but is given in the units used in our practice, that is, inches and B. W. G. Also the ultimate strength is given, for mild steel tubes, which have an ultimate strength of 70,000 lb. per sq. in.

After preparing this chart a series of 25 tests were run to verify the same and the results of these tests agreed with those indicated by the chart. While certain advantages would result from the use of alloy steel tubes of greater strength, it is usual practice to use mild carbon steel tubes, as they are easily obtained and readily worked.

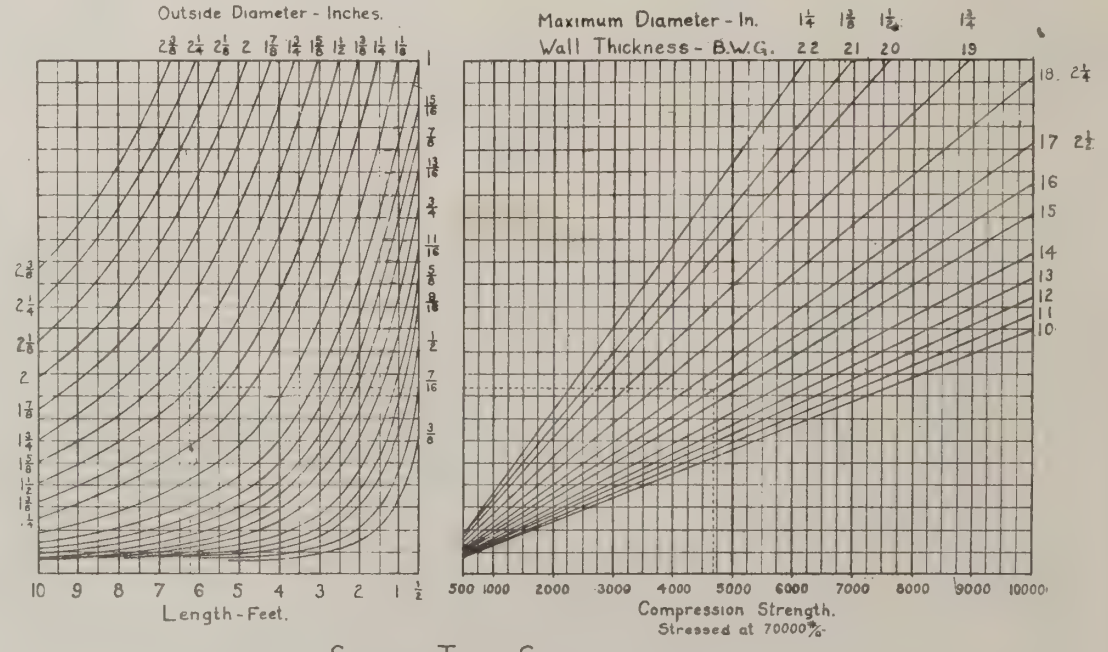
The figures at the bottom of the left graph are the length in feet, those at the top and sides are the outside diameters in inches. The figures at the top and sides of the right graph are the wall thickness in B. W. G., and above them is the maximum diameter of tube that can be used with that wall thickness, on account of crumpling. The figures at the bottom are the ultimate strengths in pounds. The figure at the left is that of a stream-line tube of equal strength to a circular one. Immediately below are the best wall thicknesses for weight and resistance for different speeds.

To find strength of tube 6¼ feet long, 1½ inches diameter and 16 B. W. G., go up vertically from 6¼ on the length in feet until intersection with the curve for diameter of 1½; from this point project horizontally over until intersection with line for 16 B. W. G, and then going vertically down we read the ultimate strength of 4700 pounds, and dividing this by the factor of safety the permissible load is obtained.



Equivalent Streamline Tube.

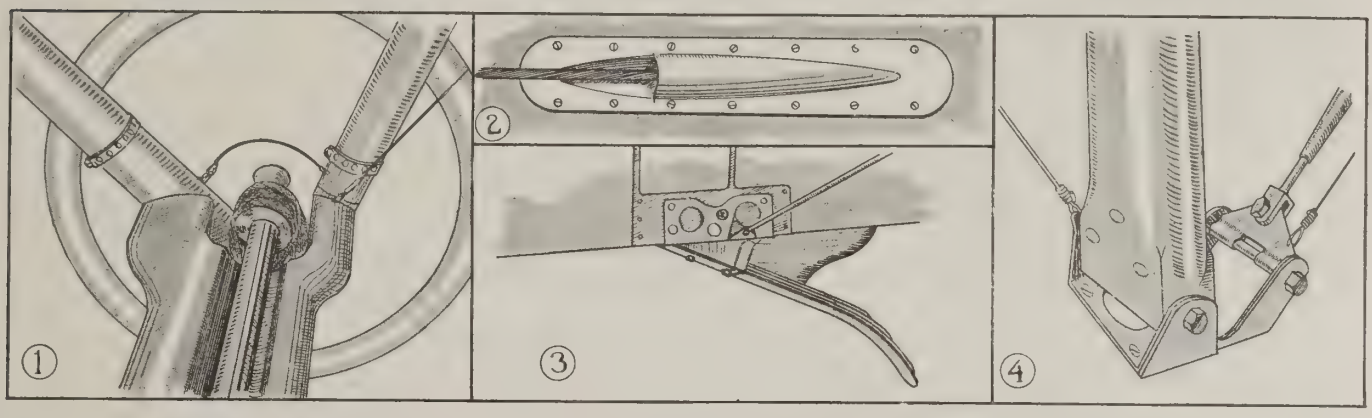
Streamline Tube.	
M.P.H.	B.W.G.
75-100	20-14
100-125	17-13
125-150	14-10



STEEL TUBE CHART.

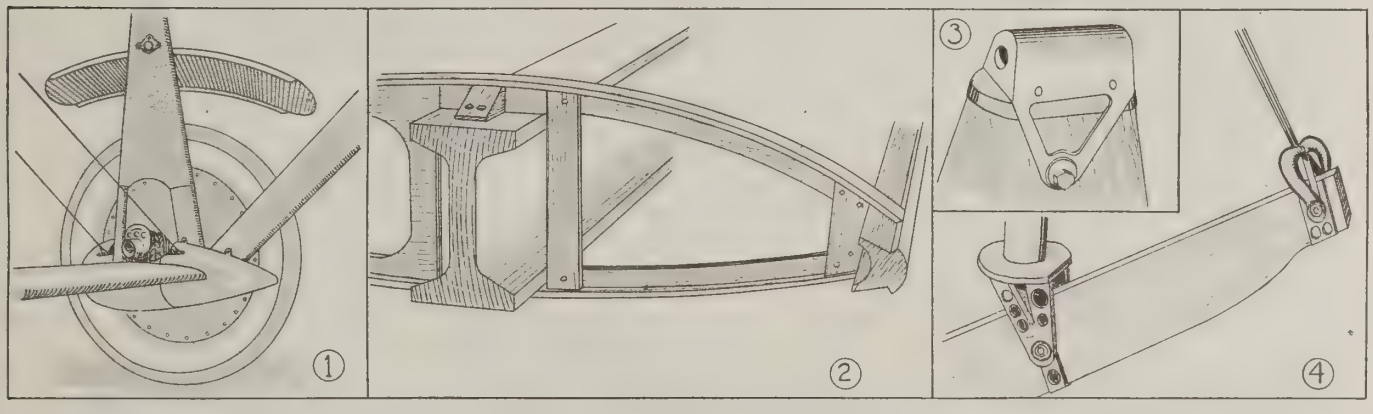
SOME DETAILS OF MODERN AEROPLANES

THE ITALIAN ANSALDO "A-1" 220 H.P. SINGLE SEATER



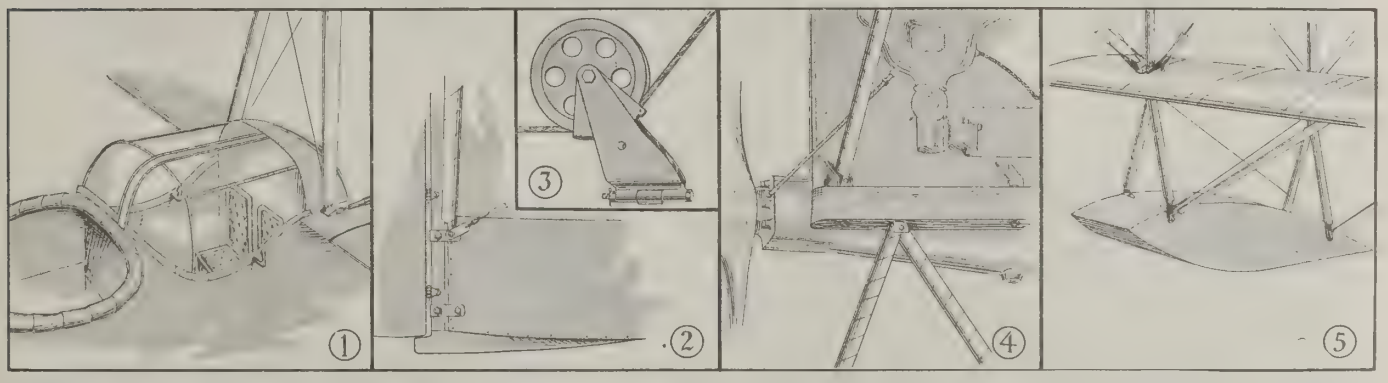
1—Landing Chassis detail, showing axle recessed into streamline sheet steel strut separating V landing gear members. 2—Aluminum friction plate outlet for rudder control cables on sides of fuselage. 3—Leafspring tail skid and attachment of the steel rod stabilizer brace. 4—Rear left lower wing strut fitting. Struts are of streamline steel tube with squared ends

THE GLENN L. MARTIN TWIN LIBERTY MOTORED BOMBER



1—One of the four landing wheels showing the streamline shock absorber casing and the wheel guard to protect the propeller from stones and mud. 2—One of the main ribs, showing sections through wing beam and leading edge. 3—Fitting at ends of wing struts. 4—Tail skid unit, with shock-absorber elastic removed

THE AEROMARINE "T-50" THREE SEATER FLYING BOAT



1—Seating arrangement, showing the open cockpit for the pilot and the two rear passengers' seats enclosed in a transparent cover, which protects the occupants from the wind and spray. The casing is divided and hinged at the middle, permitting access from either side. 2—Stern post, rudder hinges and hull skid. 3—Aileron pulley attached to the lower left plane. 4—Engine bed, and attachment of middle struts. 5—Right wing float, built up of mahogany veneer with an ash frame. The bracing is of steel tube, faired to a streamline form

A METHOD OF APPROXIMATING THE STATIC THRUST AND BRAKE HORSE-POWER OF AIR PROPELLERS*

By W. BERNARD MURPHY

SINCE data as to methods of approximating static thrust of propellers are very meagre and as many people seem content with results that may be 20 per cent from the actual figures, also ignoring the variable element of blade widths, a very important factor, a more suitable method is obviously necessary. Therefore, I wish to call your readers' attention to the Laws of Airscrews discovered by W. R. Turnbull, A.F.Ae.S.

From these laws the Static Thrust and the Brake Horse-Power (on the ground) of any propeller can easily be determined within 5 per cent of the actual values.

These laws were first published in the "Aeronautical Journal" of October, 1910, and were confirmed later by Riabouchinsky, Eiffel and others. They must not be confused with "Two Fundamental Laws of Aerodynamics," also discovered by Turnbull and published in the same journal in January, 1912.

Briefly stated, Turnbull's laws of airscrews are represented by the two formulæ:

$$T = U R^2 D^4.$$

and

$$P = Q R^3 D^5.$$

**in which T = Static Thrust in lbs.
P = B.H.P. (Absorbed by propeller revolving with no forward motion).
R = Revolutions per minute.
D = Diameter of the screw in feet.
p = Pitch of the screw in feet.

The co-efficients U and Q are variable, depending on the units employed and the relation of the Pitch (p) to the Diameter (D).

Bu using Turnbull's curves and substituting for the known quantities it is possible to determine quite accurately both the Static Thrust and the Horse-power absorbed. I reproduce the curves herewith so as to show how they may be applied to concrete cases.

It is assumed that the Brake Horse-power and the Maximum Revolutions per minute obtained in the air are known. Also, that the diameter, maximum blade-width and the ratio of the pitch to the diameter of the airscrew have been chosen. As the revolutions on the ground are always less than those obtained in the air by about 12 per cent the necessary deduction must be made to obtain accurate results.

To take an actual example, let us assume that the engine to be used give 100 B.H.P. at 1,250 revolutions per minute in the air. A maximum velocity of 100 m.p.h. is to be obtained and the diameter of the airscrew is to be 9 feet.

With the use of the curves, Figs. 1 and 2, and the above-mentioned formulæ, the Static Thrust, and Maximum blade-width are first determined in the following manner:

Maximum revolutions less 12 per cent = 1,100 revs. per min. on ground.

From the B.H.P. curves supplied by the engine makers the brake horse-power delivered at 1,100 revs. per min. is obtained, we will assume it to be 93 B.H.P.

Substituitng for the formula:—

$$P = Q \times 1100^3 \times 9^5$$

we obtain

$$93 = Q \times 1100^3 \times 9^5$$

from which

$$Q = 0.000,000,000,001,184.$$

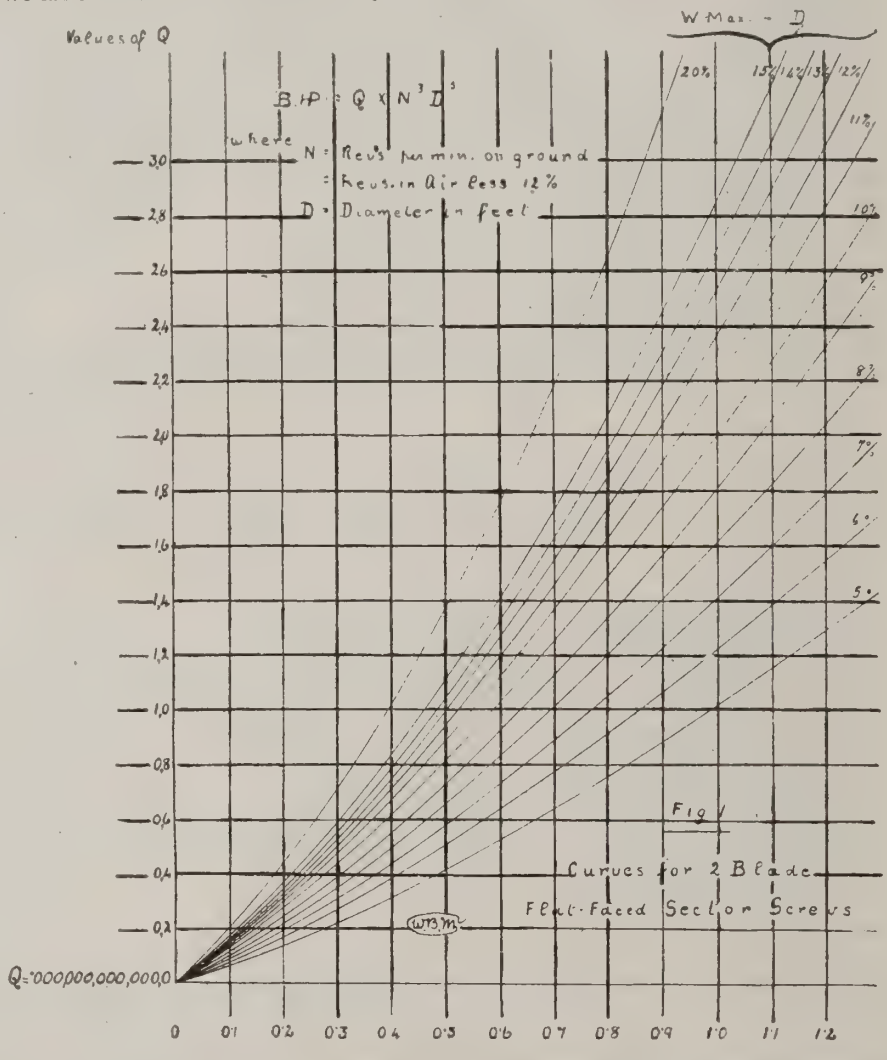
We must now determine the ratio of p/D from the air-speed of the machine assumed in this case to be V = 100 m.p.h.

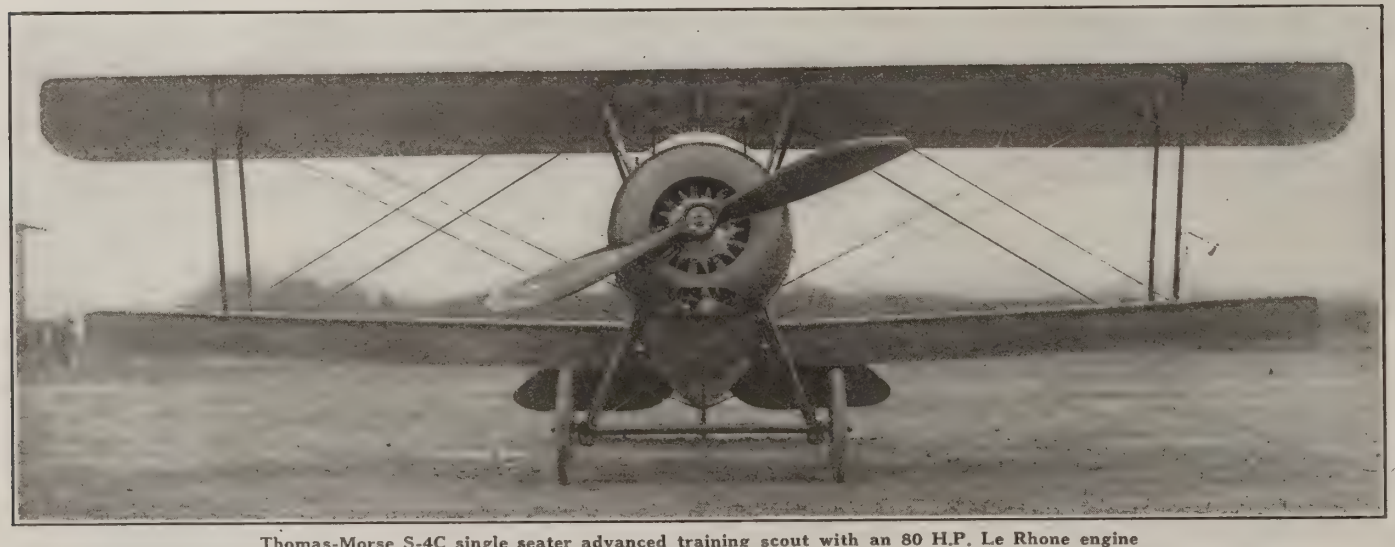
We can obtain this from the formula for pitch, viz.:—

$$p = \frac{88\,V}{R}$$

or in the case assumed $p = \frac{88 \times 100}{1250} = 7.05$ ft.†

$$\therefore p/D = \frac{7.05}{9} = 0.783.$$





Thomas-Morse S-4C single seater advanced training scout with an 80 H.P. Le Rhone engine

*Courtesy of *The Aeroplane*.

** These laws can be used with any units of time, weight, power, etc., not necessarily the English Units.

† This is the effective pitch, and for a strict consideration of the case the pitch due to the angle of attack must be added, but this is not necessary for approximate results.

We now have the ratio p/D and a value for Q, and if we enter the curves, Fig. 1, we find the maximum width (W. Max.) of a sector-screw to be 8.1 per cent of the diameter, or 8.1 per cent of 9 feet = 0.728 feet = 8.75 inches.

Having now determined our W. Max. for the conditions assumed, we can now turn to the curves on Fig. 2, and with this value and the value of p/D already found, find the corresponding value of U to be 0.000,000,059,5.

We may now by direct substitution in Formula 1 obtain the Static Thrust as follows:—

T in lbs. = $U \times R^2 \times D^4$

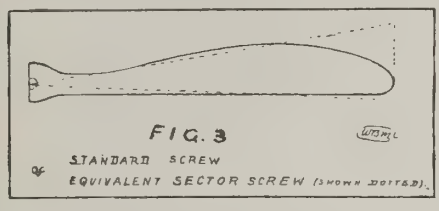
$= 0.000,000,059,5 \times 1100^2 \times 9^4$

= 472 lbs.

This gives a close approximation for 2-bladed airscrews of sector shape having a flat face, but if it is desired to obtain a similar result for the more modern shaped screws, say, having a curved leading edge and a straight trailing edge, with the maximum blade width at about ⅔ radius of the screw, it is necessary to introduce some modifications as found by Turnbull from large-sized screws of this type.

For approximate results all that is necessary is to multiply the value of the maximum width (Sector Screw values) by 1.135.

In Fig. 3 is shown the difference between Sector Screws and Standard Screws. It will be noticed that the maximum width of the former

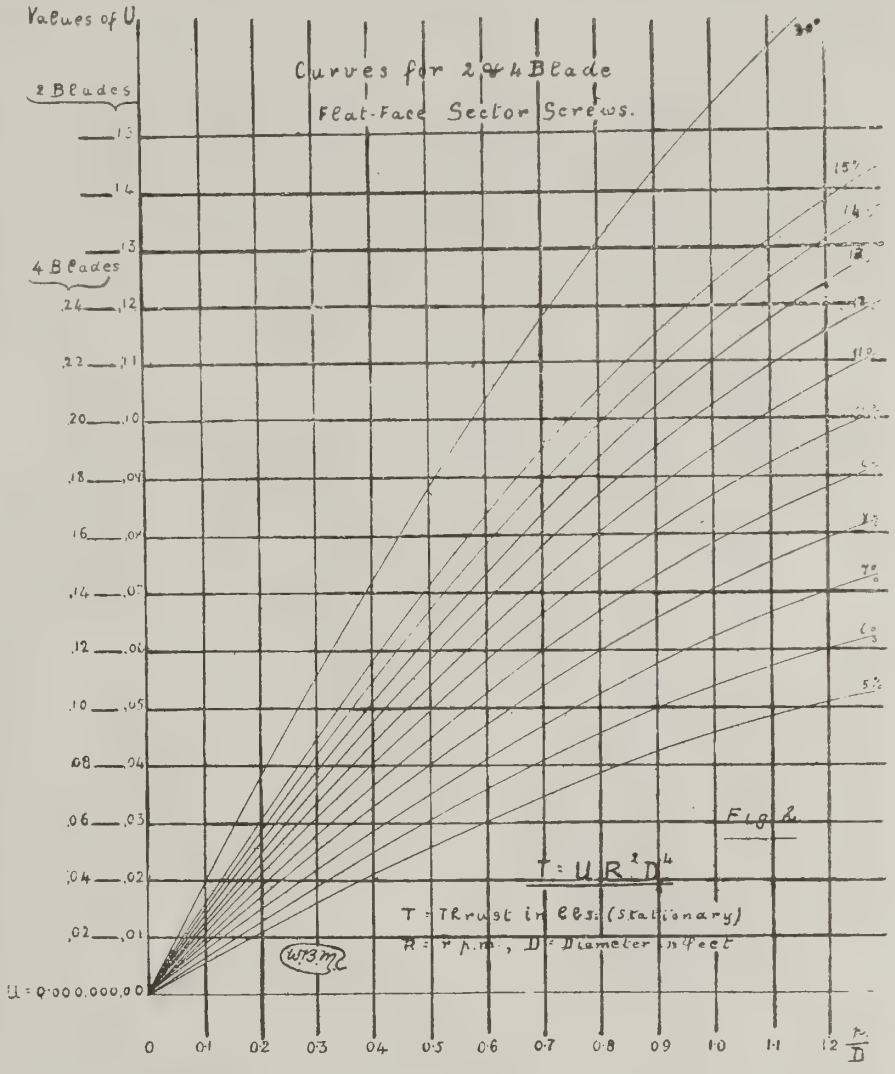


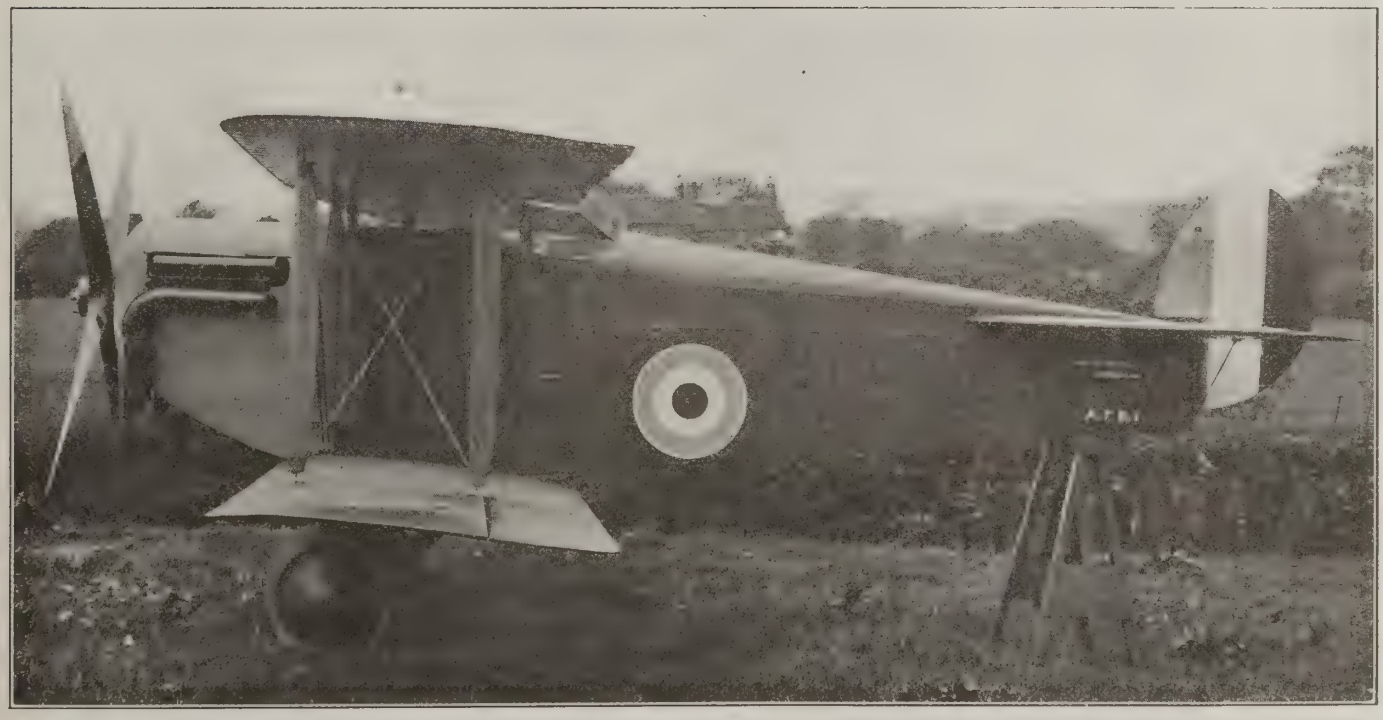
is at the blade tips, while of the latter is at ¾ of the radius. Insufficient attention has been paid to the fact that where a large horse-power has to be obsorbed by an air-screw of restricted diameter the Sector Screw is the more useful. But where the diameter is not restricted the Standard Screw is more efficient, owing to the diminution of the blade-tip losses.

I have to thank Mr. Turnbull, the discoverer of these laws, for his kind permission to publish them. Unfortunately, many of the more modern designers, having at hand the latest aerofoil data and the results of numerous actual experiments, evolve their propellers by empirical formulæ which, in some cases, show little knowledge of the actual aerodynamics concerned.

It is to be regretted that the originator of these and the other laws mentioned does not republish his old works with the addition of his more modern data in a suitable volume, which would be of immense value to the many aeronautical engineers at present trying to obtain knowledge.

It will, of course, be remembered that the recent world's height record for seaplanes was established by the aid of a Turnbull propeller.





The Austin-Ball Fighting Biplane designed and manufactured at the Austin Motor Co. in England



Some of the Allied aeroplanes that were in service when the armistice was signed. Reprinted by courtesy of The Aeroplane

SECOND PAN-AMERICAN AERONAUTIC CONVENTION AND EXHIBITION

To Be Held Under the Auspices of The Aero Club of America, The Aerial League of America and the Pan-American Aeronautic Federation.

From Thursday, May 1st, 1919,
to
June 1st, inclusive,
at
Atlantic City, N. J.

CONTESTS TO BE HELD EACH SATURDAY

(1) Seaplane Contests (general),
(2) Curtiss Marine Flying Trophy and Prizes,
(3) Intercollegiate Seaplane Contests,
(4) Land Aeroplane Contests,
(5) Dirigible Contests,
(6) Kite Balloon Speed in Ascending and Descending, and Maneuvering Contests,
(7) Parachute Competition,
(8) Aviette (bicycles and motorcycles with wings) Contests.

EVERY DAY ACTIVITIES

(1) Exhibits of Aeroplanes, Motors and Accessories on the Steel Pier,
(2) Demonstrations and tests of Seaplanes, Land Aeroplanes, Motors, Dirigibles, Kite Balloons, to prospective purchasers and representatives of different governments,
(3) Aerial Passenger Carrying by seaplanes and dirigibles, and kite balloon ascensions,
(4) Moving pictures and Addresses by leading authorities on most important phases of aeronautics.

The Governments and Aeronautic, Sporting, Scientific, Industrial and Civic organizations of the United States and all the countries in the world, excepting Germany and her allies, are invited to send representatives to attend this great aeronautic event. On arrival in the United States these representatives should call at the Headquarters of the Convention Committee at No. 297 Madison Avenue, New York City, to register and receive their official badges and the official program.

In the event that it is more convenient for them to go directly to Atlantic City they will register at the offices of the Convention located at the following Atlantic City hotels: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis and Hotel Haddon Hall.

Representatives of the Convention Committee will be at the Bureaus of the Aeronautic Convention at the above-named hotels and will issue the official badges which admit the bearer to the Aeronautic Hall, as well as the Aero Exhibition on the Steel Pier, the judges' enclosure during contests, and to the Aerodrome and seaplane stations where the aircraft and motors will be demonstrated.

All communications until May 1st, should be addressed to Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.



DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

THURSDAY, MAY 1ST

Opening of Convention and Exhibit.

AFTERNOON—Reception at Aeronautic Hall on the Steel Pier. Addresses by United States Government State and aeronautic authorities.

EVENING—Aero Show and addresses by officials.

FRIDAY, MAY 2ND

AFTERNOON—Aero Show. Preliminary tests of seaplanes, dirigibles and kite balloons.

EVENING—Moving pictures and address on flying for sport and pleasure.

SATURDAY, MAY 3RD

AFTERNOON—Seaplane and dirigible races, and kite balloon ascending and descending contest.

EVENING—Ball.

SUNDAY, MAY 4TH

MORNING—Memorial service by eminent Divine for the dead airmen.

AFTERNOON AND EVENING—Reception to allied aces and heroes of the air and their parents, and announcement of the award of the Aero Club of America Medal of Valor, and the Aerial League of America Diploma of Honor.

MONDAY, MAY 5TH

AFTERNOON—First parachute contest for $500 Bennett Prize.

EVENING—"The Large Dirigible and Its Value for Transportation." Representatives of railroads, express, steamship and other transportation organizations invited to attend.

TUESDAY, MAY 6TH

AFTERNOON—Illustrated addresses on "Aerial Forest Patrol." Forestry Department of every State invited.

EVENING—"Work of Aerial Police Squadrons, and Why Every City Should Have One."

WEDNESDAY, MAY 7TH

AFTERNOON AND EVENING—Aerial Mail Day. Illustrated address on, and consideration of, "Aerial Mail Planes." Chairman of Post Office and Post Roads Committees of House of Representatives and Senate, and Postmaster General Burleson invited to deliver addresses. (26,000 United States Postmasters, and Chambers of Commerce of 13,000 cities invited to attend.)

THURSDAY, MAY 8TH

AFTERNOON AND EVENING—Illustrated addresses on the "Need of Municipal Aerodromes, and the Part to be Played by Aircraft in City Planning." Chambers of Commerce and City Planning Commissions of 13,000 cities invited to attend.

FRIDAY, MAY 9TH

AFTERNOON—Arrival of seaplanes and army planes from Army and Navy Air Stations. Second parachute competition for the $500 Bennett Prize.

EVENING—Illustrated addresses on "Latest Developments in Aerial Warfare and Adventures in Aerial Warfare," told by famous aces.

SATURDAY, MAY 10TH

AFTERNOON—Army, Navy and Marine Corps Day. Aerial contests and tournament.

EVENING—United States Army and Navy Officers' Reception. Reception and addresses at Aeronautic Exhibition Hall on the Steel Pier.

SUNDAY, MAY 11TH

AFTERNOON AND EVENING—Presentation of the flags by each State of the United States to the Aero Squadrons representing the States. Each State will present a flag to each Aero Squadron, the members of which were overwhelmingly natives of that State. The presentation will be made by representatives from the State and the Aero Club and Aerial League branch of that State. All States and cities invited to send delegates, and Army, Navy and Marine Corps to send representatives.

MONDAY, MAY 12TH

AFTERNOON—Demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night." All national advertisers and advertising agents invited to attend.

EVENING—"Pan-American Aerial Transport Over Land." Addresses by members of the commissions of the 20 Latin-American Republics.

TUESDAY, MAY 13TH

AFTERNOON AND EVENING—"Pan-American Aerial Transport Over Water." Addresses by members of the 20 Latin-American Republics' Commissions.

WEDNESDAY AND THURSDAY, MAY 14TH AND 15TH

AFTERNOONS AND EVENINGS—"The Airways and Aerial Transport in Europe, Canada, Africa, Australia and Asia."

FRIDAY, MAY 16TH

AFTERNOON AND EVENING—"Aerial Navigation Instruments for Flying Over Land and Water." Aviators, navigators, scientific instrument makers and aeronautic experts invited.

SATURDAY, MAY 17TH

AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.

EVENING—Extensive exhibit of aerial photographs and photographic apparatus. All photographers, professional and amateur, and makers of photographic apparatus invited.

SUNDAY, MAY 18TH

AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH

AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."

EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH

AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST

AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.

EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22nd

AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Telegraphic and Climatic Factors in Relation to Aeronautics.

FRIDAY, MAY 23RD

AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulation of Air Traffic." (First day.) Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH

AFTERNOON—Races and contests.

EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH

AFTERNOON AND EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK.

MONDAY, MAY 26TH

AFTERNOON—"Aeronautic Engineering Problems and Their Prospective Solution."

EVENING—Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH

AFTERNOON—"Factors That Increase the Efficiency for Large Dirigibles."

EVENING—"Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH

AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."

EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH

AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."

EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)

AFTERNOON—Dirigible races, kite balloon speed ascending contest; parachute contest.

EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST

AFTERNOON—Seaplanes, land planes and dirigible contests. Aviette competition at which all cyclists and makers of bicycles and motorcycles will be invited.

EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST

AFTERNOON AND EVENING—Award of prizes and diplomas for all events.



Aircraft Advertising Agency, Inc.

280 Madison Avenue

New York

Telephone 1556 Vanderbilt
Cable Address: "Aero-Ads"

Western Office:
Reed G. Landis,
623 So. Wabash St.,
Chicago, Ill.

"AERO-ADS"

by

"AERO EXPERTS"

The Aircraft Advertising Agency aims to cover the whole advertising field for aeronautics, including:

The advertising of Aircraft and Accessories in periodicals and elsewhere.

Display advertising on *Dirigible Balloons,* and *Kite Balloons, Aeroplanes,* and *Streamers* from Aircraft, and by the dropping of Souvenirs and handbills from the air.

Rates on application.

The members of the Aircraft Advertising Agency are all ex-officers of the United States Air Service, with both theoretical and practical knowledge in the Aeronautic Field, assuring expert service for clients.

Granville A. Pollock, President of the Aircraft Advertising Agency, Inc., previous to his release from the Army with the rank of Captain, served in the war from its beginning and was a member of the famous "Lafayette Escadrille." In addition to this practical war service, Captain Pollock is by profession an aeronautical engineer.

S. Herbert Mapes, 1st Vice-President of the Aircraft Advertising Agency, is another Air Service Captain who has recently laid aside his uniform after having served in important capacities at various aviation training fields in this country. He is well known as an automobile racer, an exhibitor of saddle horses and a winner of Horse Show Blue ribbons, as well as being a member of many prominent clubs.

Reed Gresham Landis, of Chicago, 2nd Vice-President of the Aircraft Advertising Agency, and lately a Major in the American Air Service, has the added distinction of being the second ranking American "Ace" with 12 Air Victories to his credit. Major Landis is the Western Representative of the Aircraft Advertising Agency, to whom prospective clients in that territory may apply for information regarding service and rates.

William Menkel, Secretary of the Aircraft Advertising Agency, also served as a Captain in the Air Service, holding various positions at Washington and in the field. He was for five months, and until the end of hostilities, Commanding Officer of the efficient Aviation Repair Depot at the Speedway, Indianapolis, Ind. Previously to entering the service, Captain Menkel was for more than 15 years associated with the American Review of Reviews.

The Aircraft Advertising Company is now booking the space for exhibitors at the Second Pan-American Aeronautic Convention and Exposition at Atlantic City, N. J., May 1 to June, 1919, and also has charge of the preparation of the elaborate souvenir Program, advertising rates for which may be had on application.

SYSTEM OF TESTING FUEL JETS IN ZENITH CARBURETORS

THE manufacture of Zenith carburetors presents many interesting features. Extreme accuracy of workmanship is essential and many operations on the various parts may be compared in their delicacy and skill to the manufacture of fine watches. The inspection of finished parts is particularly thorough, and instruments for measuring and gauging are used that easily detect faults not visible to the eye. Many girls and women are employed, and their keenness of perception, interest in the work and natural aptitude are conducive to successful results.

One of the most interesting, as well as important, operations is that of testing the fuel jets. The measuring orifice of a jet is so small and its flow is dependent upon so many factors that it must be tested by actual flow of a liquid. The accompanying view of the jet testing machine shows the apparatus used for this purpose. It is described as follows:

All the Zenith jets are tested by the flow method. This consists in measuring how much water will flow through the jet in one minute when the water is maintained at a given height above the jet. It would readily be seen that this is the nearest possible approximation to the conditions to which the jet will be subjected into the carburetor.

In order to make these tests in the quantities that are required by the output, we have been led to build special machinery. One of these machines is shown in Fig. 1. It consists of a large tank in which a float controls the inlet of the water in such a manner that level of the water is maintained at a given point (a). From this tank four pipes extend downwards and terminate in a special valve (b) under which the jet under-test may be clamped. When the valve is opened, the water flows through the jet into a special glass graduate (c), which can be quickly emptied by turning a valve (b_1) at the lower end of the graduate.

RATE OF FLOW UNDER 1M. HEAD								
JET	NO.	COMP	JET	NO.	COMP.	JET	NO.	COMP.
35	**50**	42	243	**120**	265	653	**190**	714
42	**55**	52	266	**125**	288	695	**195**	754
50	**60**	62	289	**130**	311	735	**200**	784
60	**65**	72	312	**135**	338	775	**205**	825
72	**70**	83	335	**140**	368	815	**210**	870
85	**75**	95	360	**145**	397	845	**215**	915
100	**80**	109	387	**150**	425	870	**220**	960
115	**85**	121	416	**155**	455	910	**225**	1010
132	**90**	140	445	**160**	483	940	**230**	1060
149	**95**	158	475	**165**	514	970	**235**	1110
166	**100**	176	510	**170**	550	1000	**240**	
184	**105**	195	545	**175**	596		**245**	
202	**110**	215	583	**180**	634		**250**	
220	**115**	240	613	**185**	675		**255**	

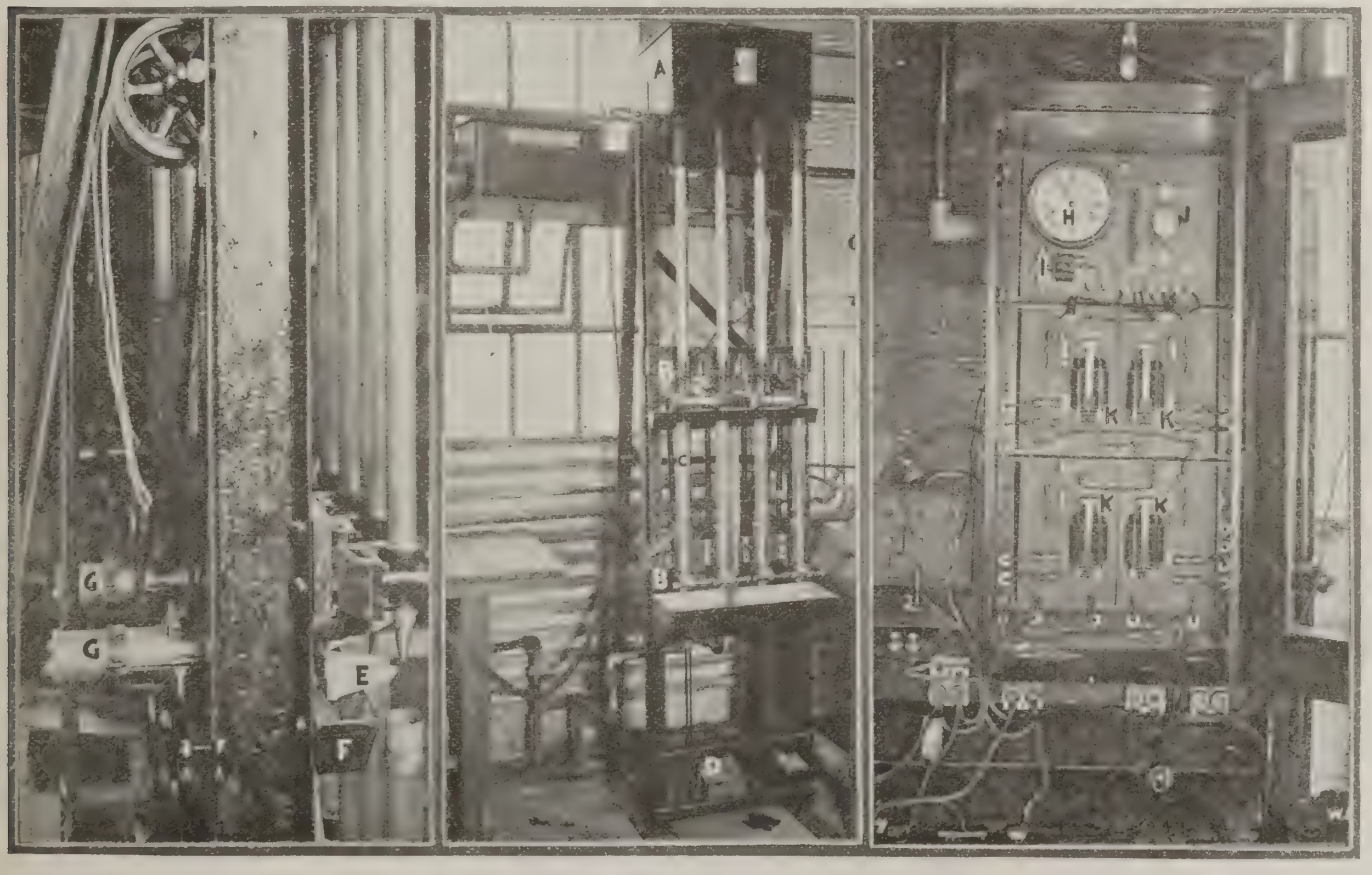
The clamping of the jet is done by a lever, and a spring at the rear of the machine presses each lever into the valve, thus clamping the jet. A pedal (b) is provided for releasing and opening these clamps.

In order to measure with accuracy the time during which the flow is taken into the graduate, a small sheet-brass box (see Fig. 2-E) is used, which can be swung under the jet and diverts the flow from the jet into a waste pan (f). When this box is swung under the jet the water flows to waste, then this box is withdrawn for one minute, during which the water flows into the graduate. The movement of the box is obtained electrically by means of an armored solenoid (see Fig. 2-G). Two boxes are connected together and actuated by the same solenoids; one solenoid for pushing the box under the jet and one for withdrawing the box.

To control the time, the electrical apparatus shown in Fig. 3-H is used. On the upper panel may be seen the master clock (h), which makes a contact every half second. Below the clock is a telegraph relay (i), which receives these impulses and transmits them to an electric clock movement (j) on the right side of the upper panel. This secondary clock movement is arranged to make contacts at a proper interval of time and distribute them to the large relay (k) shown on the second and third panel. These relays, in turn, actuate the four solenoids of each machine.

On each machine the flow is sent to the graduate for one minute and diverted for one-half minute, thus making a cycle of 90 seconds. One-half of the machine is made to lag behind the other half by 45 seconds in convenience in operation.

One operator can, with this machine, test four jets in one and one-half minutes, or 160 jets an hour.



Special machinery in Zenith Laboratory for testing of fuel jets

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Olcott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill, School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in the order named.
Note 2—Report to Keenan Building, Pittsburgh, Pa.
Note 3—Report to Coronado, Cal.
Note 4—Report to Fayetteville, N. C.
Note 5—Report to General Hospital, Hot Springs, Ark.
Note 6—Report to 360 Madison Avenue, New York City.
Note 7—Report to Baltimore, Md.
Note 8—Report to Little Rock, Ark., supply depot.
Note 9—Report to Hot Springs, Ark., to Navy General Hospital.
Note 10—Report to Godman Field, Camp Knox, Stithton, Ky.
Note 11—Report to Camp Meade, Admiral, Md.
Note 12—Report to Camp Upton, Long Island, N. Y.
Note 13—Report to Headquarters, Southern Department, Fort Sam Houston, Texas.
Note 14—Report to General Hospital No. 21, Denver, Colo.
Note 15—Report to Acting Director of Aircraft Production, aircraft finance, Chicago, Ill.
Note 16—Report to Army Balloon and Airship Detachment, Akron, Ohio.
Note 17—Report to Riverside Military Academy, Gainesville, Ga.
Note 18—Report to Aberdeen Proving Grounds, Aberdeen, Md.
Note 19—Report to General Hospital No. 9, Lakewood, N. J.
Note 20—Report to Medical Department, East Norfolk, Mass.
Note 21—Report to Technical Section, Dayton, Ohio.
Note 22—Report to France Field, Coco Walk, Canal Zone, Ancon, Panama.
Note 23—Report to Walter Reed Hospital, Washington, D. C.
Note 24—Report to Newport News, Va.

Special Orders Nos. 50 to 55, Inclusive

A
Ayers, George R.....KST
Alexander, Chas. W.....HHN
Abel, George R.....DMA
Alger, Edward E.....PFO
Alfonte, James R.....BFT
Ackerman, James H.....FRF

B
Brown, Morris Evans.....DMA
Bell, Wm. P. B.....KST
Braig, Eugene C.....DMA
Bunting, John M.....TMA

C
Cushing, Otho W.....DMA
Chamberlain, Pierre A.....DMA
Chase, Daniel Robert.....LHV
Clark, Donald M.....ABC
Cloe, Wm. E.....Note 6
Carveth, Walter H.....Note 5
Curtis, Harold B.....Note 7
Cleland. De Witt.....Note 19

D
Devers, John M.....PMT
Darby, Patrick.....DMA
Dewey, James W.....Note 22

E
Eichelberger, Gilbert R.....Note 6
Eaton, Robert H.....CAF

F
Freck, Otto Joseph.....Note 6
Ferris, Eugene M. J.....Note 22

G
Greer, John F.....RSD
Green, Paul E.....EOT
Gamble, Henry C.....PFO
Griffith, Thomas Edwin.....Note 20
Gallup, Frederick L.....Note 8

H
Heming, Henry T.....CAP
Hall, Chalmers G.....DAP
Hill, Plover P.....DMA
Harms, Henry W.....Note 21
Hill, R. C.....Note 17
Harras, Rudolph T.....Note 14
Hooper, Willis B.....EOT
Harmon, Henry G.....Note 15

K
Kingsland, George D.....DMA
King, Paul B.....AGC
Kelley, Ralph L.....KST
Kase, John A.....CAF

L
Landis, Reed G.....JMA
Landstrom, Adolph W.....KST
Lindorff, Theodore J.....Note 24

M
Mathews, Herbert S.....KST
Mason, Wm. F.....KST
McChord, Wm. C.....DAP
Mohr, James H.....CAF
McEachin, James S.....EOT
McKnight, James A.....DMA

O
Ott, Roderick N.....RSD

P
Plummer, Franklin A.....Note 9

R
Riddle, Earl C.....KST
Robertson, Benjamin S., Jr.....HHN
Reading, Wm. M.....DMA
Richter, J. Paul.....PFO
Russell, Clinton W.....CWT
Randall, Joseph F.....DMA

S
Schumacker, Chas. H.....LHV
Stoner, Rex K.....KST
Sievert, Will C.....PFO
Stetson, John B., Jr.....RSD
Saunders, Bradley J., Jr.....Note 4
Schneeberger, Philip.....Note 16
Stahlberg, Oscar Alexander.....Note 6
Smith, Edward T.....Note 21
Schaffner, Herbert A.....Note 10
Stuller, Gilbert F.....Note 18

T
Tillinghast, Theose E.....Note 21
Taylor, Le Wallace W.....Note 16

V
Vanderpool, Chas. H.....Note 11
Virgin, Joseph E.....KST

W
Welch, Peter W.....DMA
Williams, Walter D.....DAP
Wynne, Walter W.....GLC
Wheeler, Wm. D.....DMA
Warren, Wm. H.....LHV
Wiles, Richard E.....Note 3

Brigadier-General William Mitchell, Director of Military Aeronautics

General Mitchell, who was awarded the Distinguished Service Cross on July 9, 1918, was then Chief of the Air Service, 1st Army, A.E.F. He enlisted as a private in May, 1898, and served throughout the Spanish War. He was appointed first lieutenant in the Signal Corps, Regular Army, in February, 1901, was promoted to captain in March, 1903; lieutenant colonel in May, 1917. During his service overseas he was cited repeatedly for acts of extraordinary heroism in action at Noyon, March 26, 1918, and near the Marne river in July, 1918. He "displayed bravery far beyond that required by his position as Chief of the Air Service, 1st Army, setting a personal example to United States aviators by piloting his aeroplane over the battle lines." Among the instances of his service for which he was specially mentioned was a flight in a monoplane over the battlefield of Noyon and the back areas, seeing and reporting the actions of both air and ground groups, and which led to a change of the tactical methods of United States aviators; and a flight in a monoplane over the bridges the Germans had erected over the Marne, in July, 1918, which gave the first definite reports of the location of these bridges and led to the subsequent attack upon the German troops by United States air forces. In daily reconnaissances over the lines during the battle of St. Mihiel, September 12-16, he gathered valuable information of the movement of troops which led to a victorious action by the Allied airmen and other arms of the Service.

Kenly Now Colonel; Air Service Cut to Two Fields

Washington, D. C., March 11.—William L. Kenly, formerly chief of the air service, with the rank of Major General, has been given back his regular army commission as Colonel of the Field Artillery. Brigadier General William Mitchell is Director of Military Aeronautics.

Major General Charles T. Menoher has issued orders reducing the number of active fields to be used by the Air Service to two. All possible personnel will be discharged from the service, it being desired to have only those desiring regular army service on active duty.

Reorganization of the Air Service

Washington, D. C.—A detailed statement regarding the reorganization of the Air Service followed the announcement that Major General Wm. L. Kenly has been relieved of his rank as Major General in the National Army and of his assignment as Director of Military Aeronautics. General Kenly reverts to his rank as Colonel in the Field Artillery and has reported for duty to the Chief of Field Artillery. Brigadier General Wm. Mitchell, who was Assistant Chief of the Air Service, A.E.F., and later Chief of the Air Service, 3d Army of the Army of Occupation,

has succeeded General Kenly as Director of Military Aeronautics.

Major General Charles P. Menoher, Director of Air Service, has selected and announced orders in his staff. They are as follows:

Executive Staff: Executive Officer, Colonel Milton F. Davis, A. S. A.; First Asisstant Executive, Colonel William E. Gillmore, A. S., A.; Second Assistant Executive, Major Horace M. Hickam, A. S., A.; Third Assistant Executive, Brigadier General William Mitchell, U. S. A.; Fourth Assistant Executive, Lt. Colonel William F. Pearson, A. S., A.

Technical Advisory Staff: Supply—Chief, Air Service Property, Lt. Col. Augustine W. Robins, A. S., A.; Chief, Air Service Procurement, Col. Chalmers G. Hall, A. S., A.; Chief, Air Service Materials Inspection, Lt. Col. George W. Mixter, A. S., A. P.; Chief, Air Service Finance, Lt. Col. Alex. C. Downey, A. S., A. P.; Chief, Air Service Aeronautical Engineering, Col. Thurman H. Bane, A. S., A.

Training and Operations—Chief, Air Service Training, (detail to be announced later); Chief, Air Service Operations, Lt. Col. Lewis H. Brereton, A. S., A.; Chief, Air Service Gunnery, Lt. Col. Harold E. Hartney, A. S., A.; Chief, Air Service Communications, Col. Clarence C. Culver, A. S., A.; Chief, Air Service Balloons and Airships, Col. Charles DeF. Chandler, A. S., A.

Administrative Staff: Chief, Air Service Personnel, Lt. Col. Rush B. Lincoln, A. S., A.; Chief, Air Service Inspector, Lt. Col. Frank M. Andrews, A. S., A.; Chief Surgeon, Air Service, Col. Albert E. Truby, M. C.

The following-named officers have been designated as an Advisory Board, Air Service: Colonel Walter G. Kilner, M. A., A. S. A.; Colonel Arthur L. Fuller, A. S. A.; Colonel Henry C. Pratt, A. S. A.; Lt. Colonel George B. Hunter, A. S. A.; Lt. Colonel Henry W. Harms, J. M. A., A. S. A.; Major Charles R. Cameron, A. S. A., Secretary.

The following named detailed for duty in the Office of the Director of Air Service, as indicated: Assistant to Executive Officer, Lt. Col. Oscar Westover, A. S., A. P.; Assistant to Second Assistant Executive, Major John B. Reynolds, A. S. A.; Assistant to Third Assistant Executive, Col. Thomas DeWitt Milling, M. A., A. S. A.; Assistant to Fourth Assistant Executive, Major Walter H. Frank, J. M. A., A. S. A.; Assistant to Fourth Assistant Executive, Major Raycroft Walsh, J. M. A., A. S. A.; Assistant to Chief, Air Service Materials Inspection, Lt. Col. John D. Reardon, A. S., A. P.; Assistant to Chief, Air Service Finance, Lt. Col. Jacob E. Fickel, J. M. A., A. S. A.; Assistant to Chief, Air Service Finance, Lt. Col. William C. McChord, J. M. A., A. S. A.; Assistant to Chief, Air Service Aeronautical Engineering, Lt. Col. Byron Q. Jones, M. A., A. S. A.; Assistant to Chief, Air Service Training, Lt. Col. Herbert A. Dargue, M. A., A. S. A.; Assistant to Chief, Air Service Personnel, Lt. Col. Hollis C. Clerk, A. S.; A. P.; Legal Advisor to Director of Air Service, Major J. Gowan Roper, J. A.

Officers Named Reserve Military Aviators

The following-named officers have been rated as Reserve Military Aviators: First Lieutenant Donovan R. Phillips, A. S. A.; First Lieutenant Joseph T. Higgins, A. S. A.

Officers Recently Dicharged

The following officers have recently been honorably discharged from the Air Service: 1st Lieut. John H. McCann, 1st Lieut. Morris E. Brown, 2nd Lieut. James A. McKnight, 2nd Lieut. William D. Baker, Major Ira B. Joralemon, 2nd Lieut. Harold Bottomley, 2nd Lieut. John H. Christman, Lieutenant Colonel Hiram Bingham, Captain Thomas A. Box, 1st Lieut. Duerson Knight, 2nd Lieut. Clifford T. Wetherell, Captain Garland W. Powell, 2nd Lieut. George W. Sutton, Jr., 1st Lieut. John B. Shober.



Lieut. Belvin W. Maynard, who is credited with the world's looping record, having made 318 consecutive loops in 67 minutes

First Lieut. Arthur E. Easterbrook, Infantry (observer). For the following acts of extraordinary heroism in action near Exermont and Varennes, France, October 8, 1918, a bar, to be worn with the distinguished-service cross awarded him on October 3, 1918, is awarded. On October 8 Lieut. Easterbrook, with Lieut. Erwin, pilot, successfully carried out a mission of locating our infantry, despite five encounters with enemy planes. During these encounters he broke up a formation of three planes, sending one down out of control; killed or wounded an observer in an encounter with another formation, and sent a biplane crashing to the ground, besides driving away a formation of two planes and several single machines. Home address, Maj. E. P. Easterbrook, father, Fort Flagler, Wash.

Capt. Elmer R. Haslett, Air Service. For extraordinary heroism in action near Montfaucon, France, September 28, 1918. While on an artillery surveillance mission Capt. Haslett engaged four enemy planes which were about to attack the American balloon line. He succeeded in diverting them from the balloons, but in the combat his machine guns became jammed. Driving off his nearest adversary by firing a Very pistol at him, he succeeded in clearing the jam and, returning to the fight, he destroyed one hostile plane and dispersed the remainder of the group. Home address, Mrs. J. F. Haslett, mother, Cartersville, Mo.

Method fo Paying $60 Army Bonus

The War Department authorizes the following statement from the Director of Finance:

"Section 1406 of the Revenue Act, approved February 24, 1919, authorizes the payment of a bonus of $60 to officers, soldiers, field clerks and nurses of the Army upon honorable separation from active service by discharge, resignation or otherwise. This bonus is not payable to the heirs or representatives of any deceased soldier.

"Those who are discharged hereafter will receive this bonus on the same roll or voucher upon which they are paid their final pay. Those who have been discharged and have received their final pay without the $60 bonus should write a letter to the Zone Finance Officer, Lemon Building, Washington, D. C., stating their service since April 6, 1917, the date of last discharge and their present address to which they desire their bonus checks to be sent and enclosing with this letter their discharge certificate or military order for discharge or both, if both are issued. Upon the receipt by the Zone Finance Officer, Washington, D. C., of this information and the soldier's discharge certificate, this officer will cause checks to be drawn and mailed to the claimants in the order in which their claims were received by him. The discharge certificate will be returned to the soldier with the check.

It is estimated that at least 1,250,000 persons have been discharged from the Service who are entitled to the benefits of this act, and while payments will be made as expeditiously as practicable it will manifestly take considerable time to write and mail this many checks."

Air Medical Service Determines Airmen's Special Fitness

Washington.—Of each 100 flyers accepted by the medical service of the Aviation Corps, 61 are capable of flying in altitudes over 28,000 feet, 25 are capable of flying in altitudes up to 15,000 feet and 14 are capable of flying at 8,000 feet or less. Consequently, 61 are fitted for any air work, 25 may perform such work as bombing and 14 are limited to night bombing. These figures are the results of numerous tests made by the Air Medical Service, following the acceptance of candidates for flying duties.

The tests for altitude are made on the ground by means of a device called the "Flack-bag," which reduces the oxygen the aviator breathes so that within 25 minutes there is but 8 per cent. of oxygen in the tank, creating an atmosphere equal to 28,000 feet. The weaker flyers taking this test quickly react to the limited supply of oxygen.

Othere tests are also made for vision and balancing, both of which are affected by altitude. Low oxygen affects the vision. The tests given are also used to determine which men have better "night sight" for night bombing work.

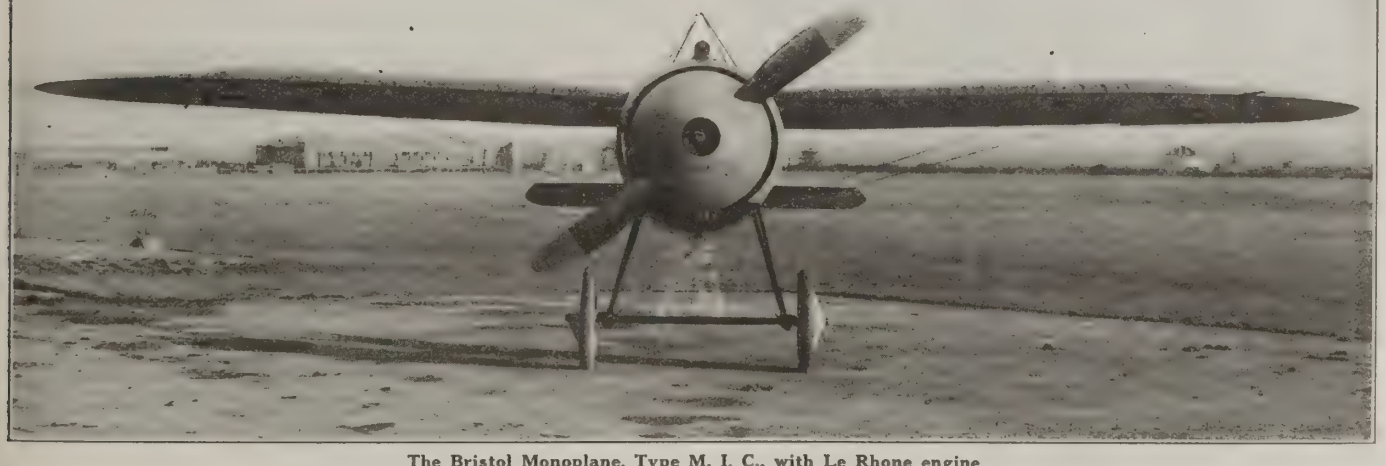
Performance of stunts and low oxygen affect the internal ear, and cause the flier to lose his balance. Consequently, examinations were made of the internal ear to determine whether or not fliers are capable of withstanding low oxygen and whether they are able to perform stunts without losing their sense of balance.

All fliers are frequently examined by a rebreathing test, as it has been found that in many instances men who are capable of standing 25,000 feet altitude at one time are not equal to it at other periods.

In making the tests for examination of stunting ability, fliers are placed in a machine called the "Ruggles Orientator." This machine allows the cadet to acquire flying experience without leaving the ground.

It is a modification of the old-fashioned universal joint, composed of three concentric rings so pivoted together as to permit the fuselage, which is pivoted within the innermost ring through every possible evolution to be experienced in actual flying. It is practically an aeroplane in every respect. The cadet sits in the fuselage and by means of control stick and rud-

(*Continued on page* 133)



The Bristol Monoplane, Type M. I. C., with Le Rhone engine

FOREIGN NEWS

Medical Aid to Aviation

Rome, March 11.—The first interallied medical aeronautical congress opened in Rome, its object being to promote the study of medical problems arising from aviation.

Resolutions dealing with physical and psychological tests applicable to candidates for pilots' licenses, the control of flights to high altitudes and the use of oxygen by aviators were presented.

It was decided to form a permanent committee to present the views of the medical profession in matters pertaining to aviation.

The United States was represented by Dr. L. G. Rowntree of Minneapolis.

$332,500,000 Requested By British Air Service

London, March 13.—During the war 8,000 enemy aeroplanes were shot down by the British air forces, while 2,800 British machines were missing, Brigadier General J. E. B. Seeley announced in the House of Commons to-day in introducing the army's air estimates of £66,500,000. General Seeley said that if the war had continued the estimate would have been £200,000,000.

When the armistice was signed, he added, England was turning out 4,000 aeroplanes a month and had 20 squadrons in commission, compared to six at the beginning of the war.

A White Paper issued to-day on the air estimates vote says the British air force of 150,000 is being reduced to 79,570 for the period of occupation. This includes the Rhine, France and Belgium, 17,420; Middle East, 3,180; home and colonial establishments, including Russia and men with the Grand Fleet, 58,970.

The vote on account requires £20,000,000 for the first five months of the fiscal year 1919-20.

No Military Aircraft for Germany

Paris, March 13 (Associated Press).—The aerial terms of German disarmament, as adopted by the Supreme War Council, provide that aeroplanes and dirigibles shall no longer be used for military purposes. The only exception is that Germany is permitted to use until October 1 100 seaplanes and 1,000 men to gather mines in the North Sea.

Germany must deliver all her aeroplanes to the Allies, and must prohibit the construction of other aeroplanes until the conclusion of peace. The terms do not decide the future fate of the aeroplanes, which may be destroyed or divided among the Allies.

First Duel in the Air is Arranged in Paris

Paris, March 12.—The first aerial duel in history was arranged to-day. Captain Schreiber and Captain Vaudeorane, the principals, will use Nieuport single-seat machines equipped with machine guns.

Their seconds, Captain Wadon and Pilot Babo, will take the air at the same time.

What caused the duel is not made public. The precise date of the encounter has not been given out, but it is expected to take place soon.

Paris, March 14.—The Paris police have taken a hand in the proposed aerial duel between Leon Vaudecrane and Robert Schreeber, former army aviators. The police give two reasons why the duel should not be held, namely, that duelling is forbidden and that people below would be endangered.

It is suggested, however, that the aviators might hold their duel over the seas.

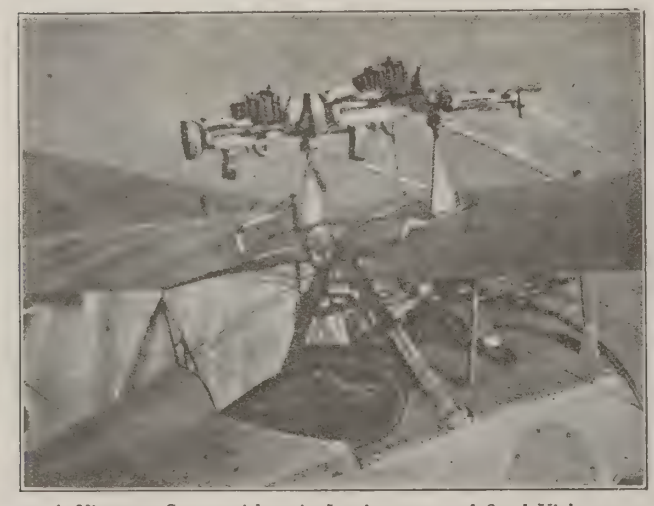
British Authorities Are Making Secret Experiments With the Helicopter

London, March 13 (Special Cable Despatch to The World).—It is understood that experiments with an apparatus destined to be embodied in a helicopter aeroplane are being conducted secretly by authorities near this city.

General Seeley, on behalf of the Air Ministry, told the House of Commons that speed far beyond any yet obtained by aircraft is claimed by sponsors for a new type which is being investigated.

Huge 1,000 Horse Power Air Ambulance Tested

Paris.—A thousand horsepower aeroplane was tested recently as an ambulance, conveying surgeons, hospital equipment and wounded.



A Nieuport Scout with twin Lewis guns and fixed Vickers gun

Bolsheviki Bomb American Lines

Archangel, March 7 (by the Associated Press).—The Bolsheviki took advantage yesterday of the first clear day, with the thermometer above freezing point, by attempting to bomb the American positions on the Vaga from an aeroplane. The machine was the first one observed to bear the new Red army identification mark, a six-pointed red star. The bombs fell without causing any damage.

Since the beginning of the campaign last summer there has been much confusion on both sides of the line because the Bolshevist aeroplanes bore the old Russian marking, a red, white and blue circle. This was so similar to the marking on the allied planes that it was hardly possible to distinguish the one from the other, and the enemy machines were sometimes able from this cause to fly within revolver range of the allied troops, gunboats and armored trains, while the allied planes were similarly able thus to approach the Bolsheviki.

French Aviator Flies 1,180 Miles in 11 Hours

Toulose, March 11 (French Wireless Service).—Lieutenant Lemaitre, a leading French aviator during the war, has completed a flight from Toulose to Casablanca, on the western coast of Morocco, a distance of 1,900 kilometres (approximately 1,180 miles), in eleven hours actual flying time.

The Lieutenant and a passenger left Toulose at noon March 8 and landed at Casablanca at 5 o'clock on March 9. The whole voyage, which lasted twenty-nine hours, was made in two stages, the first from Toulose to Alicante, Spain, and the second from Alicante to Casablanca. The voyage from Toulose to Casablanca by ordinary means consumes ten days.

New Air Record for South America

Buenos Ayres, March 10.—A new altitude record for South America was made on March 8 by Lieutenant Pardoi, an Argentine army aviator. Flying at the Palomar military aviation field, Pardoi ascended to a height of 6,480 meters (about 21,600 feet), beating the record made in 1915 by Lieutenant Zanni by nearly 300 feet.

German Sell Planes to Bolsheviki

London, March 11.—Lieutenant Porten, formerly an officer in the German aviation service, has been tried by court-martial, according to Berlin advices received in Copenhagen and forwarded by the Central News Agency, on a charge of having sold an entire park of aeroplanes at Vilna to the Bolsheviki for $500,000.

The aeroplanes were valued at $2,500,000.

Porten then fled to Koenigsberg and headed a conspiracy in the local workmen's council against the commander of the German garrison at Kovno.

The plot was discovered and Porten was arrested.

British Trans-Atlantic Flight Arrangements Maturing

London.—The first flight across the Atlantic will be attempted as soon as favorable weather appears by the Naval Branch of the Royal Air Force. This statement is made by the Sunbeam Motor Company, which is completing the mechanical equipment for a Tyne built airship.

A landing site has been selected at Newfoundland, to which the ship will fly from Ireland. It is expected that the attempt will be made before the end of this month or in the early part of April.

The Vickers, Ltd., plant at Barrow is completing designs for a giant airship said to be capable of carrying 100 passengers to the United States is a hundred hours.

Germans Bomb Berlin

Berlin, March 10.—Huge Gotha bombing planes were employed by the Government forces in subduing the Spartacists' revolution in Berlin, to clear out machine gun nests on housetops and to establish gun positions. A battery, well concealed and delivering effective fire against Government troops, was only destroyed after the air forces were employed.

Colonel Bristow Says 90 Passenger Plane is Under Construction

In a speech before the Aldwych Club of London Colonel Bristow, R. A. F., stated that he had recently been sitting in an aeroplane under construction which was designed to carry ninety-one passengers in armchairs in rows of four. According to the Colonel's statements, this giant passenger aeroplane should be completed by this time.

British Aviators' Registry

British flying men now have a labor exchange exclusively for pilots. According to the secretary of the British Aviators' Registry, Upper Baker Street London, there are dozens of big firms on the books anxious to secure efficient pilots as soon as flying restrictions are raised. One firm wants thirty pilots alone, while numerous other firms are in the market for smaller numbers.

Dirigible Makes Endurance Flight

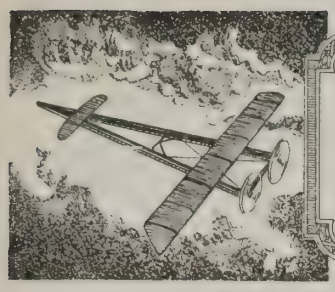
The British airship N. S. 11 succeeded in remaining four days four hours and fifty minutes in the air under the severe atmospheric conditions encountered off the coast of Scotland between Moray Firth and Aberdeen. The vessel carried a crew of ten officers and men, who were able to sleep in comfort and who cooked their meals on board. Great interest in the flight was evidenced by aircraft promotors as a forecast to extended commercial flight.

Aero Transport for International Football Contestants

Paris, March 8.—Four aeroplanes, piloted by Aviators Frantz, Gardey, Delauny and Delmas, left Villacoublay, Seine-et-Oise, at 1:20 P. M. on March 8 and arrived safely in Brussels at 3:40 o'clock. They carried passengers who will see the international football game between Belgium and France to-morrow. The French team will return to France in the aeroplanes.

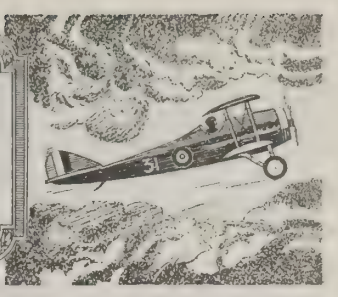
Society of British Aircraft Constructors a Permanent Organization

London.—The Society of British Aircraft Constructors, born of war necessity, is to be a permanent organization. Every maker of aircraft in Great Britain is a member of this society. There are two grades of membership: poll members, made up of manufacturers of planes and engines; and associate members, representing makers of parts, materials, etc. Steel and aluminum makers also have membership in the society. The membership of the society is divided into sections, according to manufacturing interests.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



The Motorcycle Driven Machine

THE construction of the body is much the same as the body of the Ford Motored Aeroplane. The longerons from the nose to a point half way back are of selected ash wood 7/8" square, from this point to the tail end are of spruce or fir also 7/8" square. They are then tapered at the ends for a length of 18 inches. The fir piece and the ash are then fastened together by hot glue and wrapped with silk ribbon two plies.

The body struts are of spruce or fir in the rear of the pilot's seat and ash in front of the cockpit. All are 7/8" square except those under the centre panel wing struts, the engine struts and the compression struts to which the bottom wings butt against. These are 2 x 1" and are diamond shape in cross section. That is the square edges are cut out to lighten without decreasing the strength to any great extent.

The body fittings that were in use on the other machine described can be used for this machine, as well as all the other fittings.

The landing chassis is built up of ash straight grained 3 x 1" and stream lined except at the ends which are left square.

The wings are built up in the same fashion as the previous machine, but there is one thing that the reader must remember, and that is to make the ribs light. The webs should not be over 3/16" thick, in fact it is better to have them nearer 1/8", but a fair compromise would be 5/32". The battens or straps along the top of the ribs must also be light. The dimensions for these should be 1/2" scant by 5/32". Webs and battens should be made of clear spruce, but fir can be used for the webs if necessary. The weight of a finished full rib should be four ounces. I have received letters from readers who are building the Ford Motored Machine and some of them tell me that their ribs weigh as much as six ounces. This is too much; the weight of the Ford rib must not go over five ounces at the most.

The principal thing to remember when making this machine is to keep all parts within the limit that I specify to insure the minimum weight being realized, which is necessary for successful flight.

The little half ribs should have only a batten and a former to hold it in shape along the top only. This half rib should extend to the front wing spar only, and is fastened to it by a little glue and a brass brad.

Ailerons are constructed the same as for the other machine. The aileron control arm is made of tubing also but it should only be five inches between the centre of the hole at the top to where the flattened part begins. When the Aileron is covered a piece of wood streamlined and cut to a sort of a triangle shape is placed behind the tubing and fastened to it neatly with a piece of silk covering the tubing and the wood former. The wood former is then fastened to rib to keep it from turning. A little dope should then be applied and then a coat of varnish or if the builder so desires a little paint.

When the wings and ailerons are completed they are covered with a cotton cloth or unbleached muslin which is fastened to the inside ribs first with tacks and cotton tape to keep the cloth from pulling over the tacks, then pulled tightly and fastened to the last rib from the outside tip of the wing. The cloth is then tacked along the entering edge. When this is finished the top and bottom coverings are folded over the steel wire edge at the rear and sewed close to the trailing edge.

Dope should then be applied. (Regarding "DOPE." Many inquiries have been received asking what dope is and why it is used. The term "DOPE" is applied to the fluid which is applied to the covering on aeroplane wings to fill the pores of the cloth which would otherwise allow the air to leak through as it were and of course the machine could not fly, and also to cause the covering to shrink, making it drum tight, which is desirable to enable the wing to pass through the air cleanly. A good dope can be made by boiling glue, 1 pound, alum, 2 ounces, glicerine 6 ounces in a quart of water. This of course will not give the best results, but it was used in the old days in place of something better. Today many good dopes are on the market and I would refer the readers to the advertising columns, as many firms are advertising good dopes and aeroplane varnishes at reasonable prices, almost as cheap as the reader could make it up himself and many hundred per cent better.)

As I started to say, the wings should be given two coats of dope, sand papering or rubbing with steel wool after the first coat. When the two coats of dope are applied the varnish or a color should be applied.

The body is also covered with muslin, but not until all the controls are fitted and in working order. Instead of making the control stick pivoting on a rocking bar, we will have it attached at the botton end and free to move in any direction. The control cables will be attached at a point 6" from the bottom end. The Elevator cable passes around a pulley in front and then under the pilot's seat to the rear where it attaches to the elevator control arms.

(To be continued)

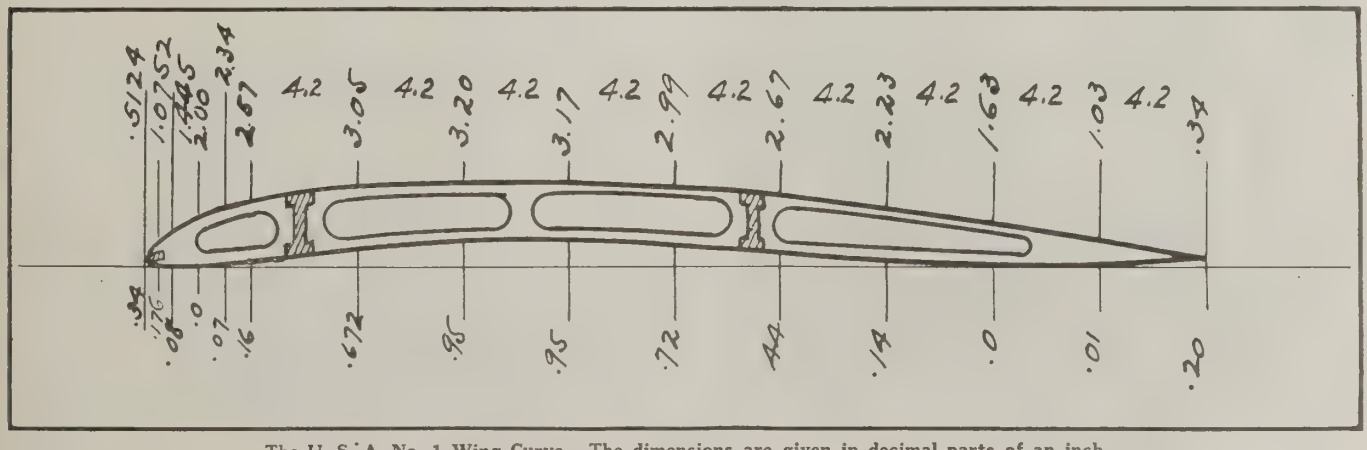
Wading River Manufacturing Company

The Wading River Manufacturing Company announces their new catalog, containing many new up-to-date models built to scale and driven by rubber bands. The models are sold in knock-down form and can be assembled by the average schoolboy by the help of a blue print simply gotten up, which helps in the construction of the model.

The list of models contains the Curtiss JN-4B, Sopwith Triplane, Spad, Nieuport, Caproni, Biplane, Handley-Page, The De Haviland 4, that every American boy loves to hear mentioned on account of its help in ending the war, and racing models for those who prefer this type of machine.

The Wading River Company announces that they intend giving a prize in conjunction with the coming contests to the boys or men who purchase their parts from them.

It would be worth the reader's trouble to get one of these new catalogs. The address of the Wading River Company is listed in the classified columns of this paper.



The U. S. A. No. 1 Wing Curve. The dimensions are given in decimal parts of an inch



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

John Peel Up to Date

(Airmen in their machines saw the sport from the sky, but though they 'viewed' the fox, the noise of the engines drowned their 'holloas'."—*Daily Mail.*)

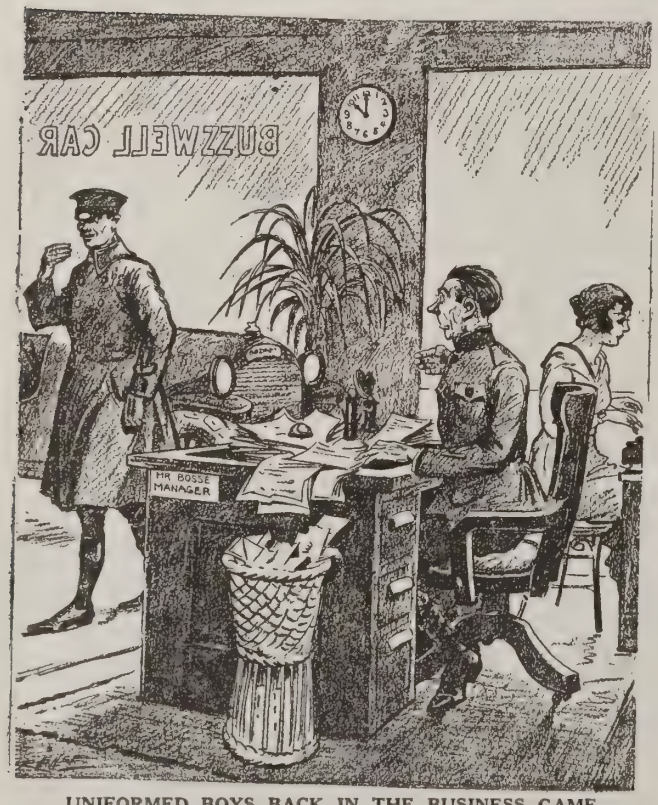
D'ye ken the lads of the Velvoir hunt,
Have you heard the tale of their latest stunt:
How they brought their 'planes from the battle front
And they flew with the hounds in the morning?

They were sportsmen all, they were blithe and gay,
As they rose with the lark at the break of day;
And they flew o'er the hills and far away
With the Velvoir pack in the morning.

Oh, the wind was keen, and the engines sang,
And the hill and dale to their shouting rang
As their faces felt the joyous twang
Of the frosty air of the morning.

D'ye ken the boys of the Belvoir pack?
Old Reynard hopes they will not come back:
For he quite forgot to double his track
At their "view-hallo" in the morning.

AUBREY ENGLAND in *Aircraft* (London).



UNIFORMED BOYS BACK IN THE BUSINESS GAME

Private Bosse salutes Capt. Salesman, who gets down in the morning a trifle late

(From the *N. Y. World*)

There was a young fellow named Payze,
Who thought out the means and the wayze,
In manner romantic,
To fly the Atlantic,
And his name on the walls of Time blayze.

From *Aircraft.*

Sam: Look at that chap in that aeroplane. Shouldn't like to be up there in it.
Mike: I shouldn't like to be up there without it.

"Daddy, why do they call that airship a Blimp?"
"Because it looks like one."
"What is a Blimp, daddy?"
"Oh, eat your d——d bun and shut up."

First Hun: "How did der story of der Crown Prince's death get aboud?"
Second Hun: "Because we a story circulated to throw dust in der eyes of hated England dot he in an aeroplane had escaped."
First Hun: "But there was no story circulated dot the 'plane had been lost?"
Second Hun: "No, but everybody who knew der Crown Prince thought dot if he in an aeroplane went up, he must haf died of fright."

A Scot persuaded a friend to take him up for a flip. In looping the loop he dropped a coin out of his trouser pocket.
Later, while the two were flying over an ornamental pond, the Scot tapped the airman on the shoulder and shouted:
"Let's awa' doon, mon; I can see ma saxpence."

The Village Blacksmith

(Revised R.A.F. Version)

Under the spreading hangar roof
The sergeant-major stands;
A fierce, imposing monster he;
All quake at his commands.
And the thunder of his booming voice
Is worse than German bands!

His hair is cropped beyond recall,
His face is like a boot;
His brow is wet with thoughts of debt
Incurred when a recruit.
He looks nobody in the face
(If so, they'd have to scoot!)

He goes at midday to the mess
And sits among the swells;
Then drags defaulters by the neck
And dumps them in the cells.
While his massive fists are tightly clenched
Like those of Billy Wells!

Week in, week out, from morn till night,
You can hear him curse the day
When he started on his maiden flight
And a beastly strut gave way,
When (according to his own account)
He was foremost in the fray!

Strafing, abusing, bellowing,
Onward through life he goes,
Each morning he contrives to add
To many an A/M's woes.
Something attempted, someone "run,"
Will earn him a damaged nose!

G. R. S. in *The Olympian.*

AEROPLANE CRANKSHAFTS

WE have furnished crankshaft forgings for all the leading aeroplanes made in the United States and in the allied countries. The results of our experience gained in the rapid War time development in this and other important aircraft forgings are at your command.

WYMAN-GORDON COMPANY

WORCESTER, MASS. Established 1883 CLEVELAND, OHIO

Pioneers in British Aviation

Blackburn AIRCRAFT

Made by The BLACKBURN AEROPLANE & MOTOR CO., Ltd., at their extensive Works and Aerodromes in Yorkshire England.

Land Machines—Seaplanes—Flying Boats

Steele's Adv. Service

(*Continued from page* 123)

der puts himself through all the evolutions he is later to experience in the air. These evolutions stimulate the internal ear, which send the nerve impulses to the brain. Consequently, after flying day after day in this apparatus the cadet is entirely familiar with the sensations he will experience in an air flight. He is thus prepared to realize and cope with the peculiar conditions incidental to aviation.

The Air Medical Service divides its system of operation in three ways: Selection, classification and maintenance. Tests for selection are standardized. Examiners making the tests are also standardized.

A late innovation in the Air Medical Service includes what is known as the Flight Surgeon, who examines intimately the conditions in aviation accidents, and makes recommendations accordingly. For example: He finds that the cowl of an aeroplane provides too little play for the head, and that fliers cut their heads in crashes as a result. He recommends more room. Such recommendations have been shown to result in 10 to 30 per cent. less accidents. Another recommendation instituted the use of a rubber shock absorber, used to attach the safety belt to the machine. This lessened the number of broken ribs.

An Aeroplane Life Saving Safety Appliance

With the wonderful progress and development in aircraft in general and the application of scientific study and inventive genius to perfect reliable power engines, necessary control instruments and safer wing structure under stimulus of war needs, there is now an increasing demand for consideration of a reliable, practical life-saving method in case of accident to aeroplanes in flight.

This problem begins and ends with man-carrying parachutes which have now been developed to a degree of reliability, but a parachute carried on an aeroplane in flight is of no use whatever unless means are provided to successfully launch it instantly when needed and in such manner that parachute and its suspension ropes cannot be fouled by the aeroplane and prevented from successfully launching with its passenger. No method of launching a parachute from a container by the jumping out of the passenger from an aeroplane falling out of control will be dependable, for reason that the aeroplane would be falling as fast or faster than the passenger after jumping out, and as the parachute and suspension ropes is fully 70 feet in strung-out length, there is small chance of parachute not being fouled, especially as when opening, the parachute and passenger attached must slow up in rate of descent and when fully opened out the parachute is fully 35 feet in diameter, thus making an object of such size as to be unlikely to escape being fouled by the falling aeroplane. These facts are evident and require that some means be provided to launch the parachute by pulling it out of the container instantly by an applied force other than gravity of falling passenger. A recent invention of Henry M. Crowther, M.E., of Arizona, provides a system of instantly launching, automatically, a parachute from a carrying case mounted permanently within the fuselage space and accomplishes the rapid launching of parachute by the firing of a light shell from a gun loaded with a light charge of powder and to the shell or projectile is attached a short tow line, the opposite end of which being previously attached to the top of the parachute, and the tow line is provided with a shock absorber in form of a number of elastic rubber ribbons of several feet in length, and arranged parallel, to absorb the shock of inertia of rapidly launching the parachute from its case. This shock absorber section of the tow line is fastened to the top of the parachute. There is also provided means of cutting the tow line and its attached shell or projectile free from the parachute as soon as the parachute and its suspension ropes are fully launched in suspended, fully strung out, collapsed condition above the aeroplane, ready to open out.

The cutting loose device consists of a small triangular knife that severs the tow line anchorage rope automatically at proper moment when parachute is fully drawn out of its case and in the air ready to open out. The aviator wears a shoulder harness and the end of the parachute suspension ropes is attached to the aviator's harness, by snap hook, before beginning flight. The parachute is launched in fully strung out and collapsed condition by the tow line drawn by the fired shell, pulling parachute out of its case, top end first, and fully launched in such condition the tow line and attached shell automatically frees itself from parachute, and the aeroplane and passenger with parachute previously attached, continuing to fall, will presently cause the parachute to open out in usual manner and lift passenger free from the aeroplane to descend safely.

The aviator has only to pull trigger, thus firing the gun and discharging the shell with its tow line previously attached, and wait for the parachute to launch and open and lift him free from falling plane. The whole apparatus being mounted and carried in place ready for instant use. The tow line and parachute are carried in separate containers having covers which automatically open by movement of the tow line. The shell or projectile may be fired by use of a coil spring powered gun or by compressed air gun, as well as by explosive powder charged cartridge. It is estimated that the entire apparatus, including parachute, will not exceed 80 pounds in weight, and being all contained within the skin of fuselage will not offer any wind resistance during flight of aeroplane.

The parachute should be fully launched and have lifted the passenger free within less than three seconds after discharge of shell.

The system is adaptable for several passengers by providing a life-saving unit for each person. The particular merits of each type of launching gun and style of shell or projectile carrying tow line that launches the parachute, and the most suitable length and elastic resistance of shock absorber elastic ribbons, will be determined by experiment on the ground, and with these details perfected the apparatus is ready to try out with 150-pound sandbag dummy during flight.

It is, however, more difficult for an aeroplane in control to be manipulated most favorably for launching this apparatus, since method will operate more perfectly if aeroplane is actually falling while out of control, and this fact is an important distinction to consider, as several other methods proposed to accomplish this service will only operate with certainty with aeroplane in control or especially maneuvered favorably to launching of a parachute. There is a psychological consideration in the fact that it may be assumed that every aeroplane passenger would have nerve enough to pull a trigger and await action of an automatic life-saving device, whereas it would be a person of exceptional bravery who would jump overboard in case of accident, especially soon enough, even though he had a favorable chance to do so, as would be required in use of any non-automatic system for this purpose.

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AERIAL AGE WEEKLY

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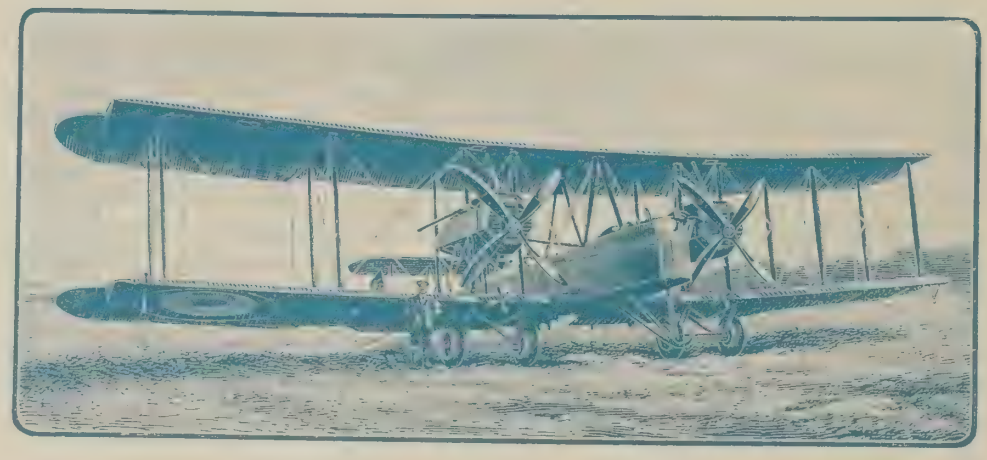
$30,000 Cash Prizes and Trophies for Atlantic City Aerial Contests

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VOL. IX NEW YORK, MARCH 31, 1919 NO. 3

$30,000 CASH PRIZES AND TROPHIES FOR ATLANTIC CITY AERIAL CONTESTS

COLONEL BISHOP OFFERS "ACE OF ACES" TROPHY

THIRTY thousand dollars in cash prizes and trophies has already been offered for the Atlantic City aerial contests which are to begin on Saturday, May 3rd.

Harvard Has Made Two Entrees Yale University to Compete

The Harvard Aeronautical Society has notified the Aero Club of America that it will enter for both the seaplane and landplane intercollegiate contests. Yale University is to compete and is developing plans to that effect. Other universities are summoning their aviators and balloonists and half a dozen entries may be expected within a week.

Colonel Bishop Offers "Ace of Aces" Trophy

To encourage the development of aerial navigation and to stimulate aerial sport between Canada, his native country, and the United States, Colonel William A. Bishop, British Ace of Aces, has offered, through the Aero Club of America, an international trophy for annual competition.

The trophy presented by Colonel Bishop is to be known as the "Ace of Aces Trophy" and is to be awarded in 1919 to the aviator who makes the greatest speed in a contest from Toronto to Atlantic City, to be held in May during the Second Pan-American Aeronautic Federation, which is to be held at Atlantic City from May 1st to May 31st, 1919.

Colonel Bishop is the winner of 72 official battles in the air in which he brought down his German opponent, and he has an unofficial record of over 100 enemy machines.

He is now the Honorable Aide de Camp to the Governor General of Canada, and has been decorated with the Victoria Cross, Distinguished Service Medal, Military Cross and Distinguished Flying Cross; also with the special War Medal of the Aero Club of America.

He had in his squadron three Americans, of whom he says "they did themselves proud I can tell you." They were Spriggs of New York, who got fifteen machines; Grider, who was killed; and Callahan of Chicago, who downed ten Huns.

Colonel Bishop is particularly interested in developing speed contests and bringing closer relations between Canada and the United States.

Atlantic City Aero Club Offers $10,000 for First Trans-Atlantic Flight

The Atlantic City Aero Club has offered a cash prize of $10,000 to be awarded to the pilot of the first aircraft to fly over the Atlantic, which starts from or terminates at Atlantic City during the month of May. The general conditions of this competition are approximately the conditions of the Daily Mail $50,000 prize. Entry blanks can be obtained from the Secretary of the Aero Club of America, 297 Madison Avenue, New York, or from President Albert T. Bell, of the Aero Club of Atlantic City, Atlantic City, New Jersey.

Contests for $5,000 Additional Prizes to be Announced

A contest for $5,000 additional cash prize is to be announced within a few days. The details are being worked out as AERIAL AGE goes to press. The prize will be for land aeroplanes.

The contests, which are sanctioned by the Contest Committee of the Aero Club of America, under the rules of the International Aeronautic Federation, which govern all aerial contests, are as follows:

The Valentine Weekly Efficiency Marine Flying Contest

The prizes (awarded under the terms of the Samuel H. Valentine will) are to be awarded for the greatest number of laps covered in flying over a 60 mile course with the Steel Pier, Atlantic City, as starting point and Cape May Naval Air Station as turning point, during the five Saturdays of the Convention:

First Prize	$1,000
Second Prize	500
Third Prize	250
Fourth Prize	100

The race is to start at 10 A. M. and last until 5 P. M., each of the five Saturdays in the month of May.

The laps start and end at the Steel Pier. Only complete laps count.

Curtiss 1,000 Miles Non-Stop Seaplane Contest

Mr. Glenn H. Curtiss has offered a prize of $1,000 to go to the first entrant for the Curtiss Marine Flying Trophy who covers the distance of 1,000 miles without stopping. The contest for this prize will open on May 1 and continue until it has been accomplished.

The entrants who wish to compete for this prize during the Convention can fly over the 60 miles course between the Steel Pier and Cape May Air Station, and can compete for the Valentine Efficiency Marine Flying Prizes at the same time.

The entrant's record will be counted as a flight for the Curtiss Marine Flying Trophy under the rules for the 1919 competition for this trophy.

Open Seaplane Speed Contest (with handicap)

for 42 laps of 5 miles each. To be held on Decoration Day, May 30.

First Prize	$1,000
Second Prize	500
Third Prize	250

Aerial Commuting Prizes

(1) To be awarded to entrants who cover the greatest total distance in commuting by air from anywhere to Atlantic City during the period of the Convention.

First Prize.....Gold Medal
Second Prize.....Silver Medal
Third Prize.....Bronze Medal
(Distance to be measured in straight line.)

(2) To be awarded to entrants who make the greatest number of trips in commuting by air from anywhere to Atlantic City during the period of the Convention.

First Prize.....Gold Medal
Second Prize.....Silver Medal
Third Prize.....Bronze Medal

(3) To be awarded to entrants who make the longest flight in commuting from anywhere to Atlantic City during the period of the Convention. (Drstance to be measured in straight line.)

First Prize.....Gold Medal
Second Prize.....Silver Medal
Third Prize.....Bronze Medal

Army, Navy and Marine Corps Contest for Accuracy in Bomb Dropping on a Floating Target

This contest is to be held every Saturday during the Convention and on Decoration Day.

Both land machines and seaplanes are permitted to compete, but slow machines must fly higher than fast machines, to equalize the chances of hitting the target.

First Prize.....Gold Medal
Second Prize.....Silver Medal
Third Prize.....Bronze Medal

To enable the hundreds of thousands of college men who were in the Army and Navy and Marine Corps Air Service but have left the service, to continue their training in aeronautics, both as a measure of national preparedness and as a means of facilitating their remaining in the aeronautic movement, the Aero Club of America and the Aerial League of America have arranged to hold a series of intercollegiate tournaments at Atlantic City during the coming summer.

The first of these intercollegiate contests, which are to be held in May, are as follows:

Intercollegiate Seaplane Speed Race

Over a five mile course, for the $2,000 Intercollegiate Trophy. This event is open to graduates and under-graduates whether in military or civilian life.

Dirigible Speed Contest (With Handicap) For the Aerial League of America Silver Trophy

This contest is open to Army, Navy, aero clubs, colleges and aeronautic organizations. It will be held on the afternoon of Saturday, May 3; Saturday May 10; Saturday, May 17; Saturday, May 24; Friday, May 30, and Saturday, May 31.

Each member of the winning crew of each race will receive a silver plaque of the trophy.

The names of the members of the winning crew of each race will be inscribed on the trophy, which is to be competed for annually.

The race will be for the speed (under conditions of the handicap) made at each race.

After these events are over a few weeks will be allowed for preparation and then the following contests will be held:

Three Months Intercollegiate Seaplane Tournament

This will be an intercollegiate seaplane tournament to last three months. The contests will be held every Saturday, and the college holding the largest number of points at the end of the month, each month, will be considered the winner for that month. The second best the second; the third best the third.

But the final winner will be the college which has the largest number of points at the end of three months.

Each college will be permitted to have three entries. The pilots may be changed weekly, the change being left entirely to the discretion of the college which has made the entry.

This plan will permit the testing of a number of collegiate aviators and finding the best. It will also give an opportunity to a college which may have had a very low number of points during the first and second months to catch up with the leader during the last month.

Three Months Intercollegiate Aeroplane Tournament

There will also be held a Three Months Land Aeroplane Race, to be governed by the same rules as stated above.

Three Months Intercollegiate Dirigible Tournament

To provide for practice with dirigibles and give opportunities to college men to participate in the development of this wonderful and most progressive branch of aeronautics, there will also be held a Three Months Intercollegiate Dirigible Tournament, to be governed by the same rules as stated above.

The Aero Club of America and Aerial League of America authorities have been assured that the Army and Navy will be glad to co-operate and permit Army and Navy officers who are dirigible balloon pilots to represent their respective colleges in the dirigible balloon tournament.

Three Months Intercollegiate Spherical or Kite Balloon Operating Tournament

In view of the fact that, owing to the nearness to the Atlantic, it would be impossible to hold free balloon races from Atlantic City, plans have been made for holding the Intercollegiate Free Balloon Races elsewhere in the latter part of the Summer. To afford training to college men in the operation of balloons, there will be held a Three Months Intercollegiate Balloon Operating Contest, to be governed by rules similar to the rules for the seaplane tournament.

The contest will consist of the important work of lay out the balloon, inflating, and send it up, with two or more men on board, who will take observations and communicate with the people on the ground by telephone.

The trophy will be awarded for the speed and efficiency in laying out, inflating, and sending up the balloon, as well as for the work of the men on board.

Provision is being made at the Atlantic City Aviation Field for housing the land planes and balloons. Arrangements are also being made for housing and taking care of the seaplanes. Provision will be made for experts to look after the aircraft used for the intercollegiate races, and every facility will be given so that undergraduates, as well as graduates, can compete in the May contests with a minimum loss of expenditure of time.

Great enthusiasm has been aroused in intercollegiate circles by the announcement of these intercollegiate aerial contests, and it is expected that the entries will be numerous and the events will be of great value to the nation, and will be a means of keeping up the development of American aeronautics as well as giving an opportunity to college men to participate in the program of aeronautics.

United States Army, Navy and Marine Corps aviators and balloon observers, in the Service or out of the Service, who wish to compete with the teams of their colleges or to start teams, should apply to Mr. Alan R. Hawley, chairman, Contest Committee, Aero Club of America, 297 Madison Avenue, New York City.

An international contest in which the Allied aces already in this country or on their way over would compete, is being considered by the Contest Committee of the Aero Club of America, which includes the following prominent military and civilian authorities in aeronautics and intercollegiate sports: Alan R. Hawley, Chairman; Lieut. Com. P. N. L. Bellinger, U. S. N.; Col. G. C. Brant, U. S. A.; W. Redmond Cross, Lieut. Godfrey L. Cabot, U. S. N.; Walter Camp; Col. Milton F. Davis, U. S. A.; Col. C. de F. Chandler, U. S. A.; Major A. B. Lambert, U. S. A.; Major William McIlvain, U S. M. C.; Col. James Prentice, U. S. A.; Major J. C. McCoy, U. S. A.; Com. H. C. Mustin, U. S. N.; Lieut. Com. John H. Towers, U. S. N.; Henry A. Wise Wood and Henry Woodhouse.

TRANS-ATLANTIC FLIGHT AN INTERNATIONAL RACE

AT last the flight across the Atlantic is to be made. The certainty that it will be made is supplied by the fact that the four great nations, France, Italy, Great Britain and the United States are to try it almost simultaneously. Some of the trans-Atlantic flight plans which have been secret for a number of months are being announced in such swift succession that all of a dozen such plans will be made public before AERIAL AGE leaves the presses.

The plans made public at the time of going to press are as follows:

The American Efforts

Lieut. Commander Patrick N. L. Bellinger, until recently commandant of the air station of the Naval Operating Base at Hampton Roads and the 5th Naval District, will pilot the United States naval seaplane that will attempt to cross the Atlantic Ocean.

Lieut. Commander Bellinger received official notification from the Navy Department to come to Washington for a conference before attempting the flight.

He declared that he did not know just when the start would be made, but thought it would be as soon as there was reasonable likelihood of favorable weather setting in with the approach of spring. He said he did not have any doubts as to the final outcome unless the elements interfered. He felt confident that the flight would prove successful.

Lieut. Commander Bellinger is considered to be the Navy's best aviator. He has made some remarkable flights to sea and his general knowledge of all makes of flying machines won for him the command of the largest aviation unit in the Navy during the war. He stated that he did not know where the flight would start from, but it is said in naval circles that Hampton Roads has been selected and that the route would probably be from here to Bermuda, about 800 miles, thence to a point on the Irish coast, about 1,600 miles.

Lieut. Commander Bellinger has been conducting experimental flights for the last two weeks. He flew several hundred miles to sea a few days ago and picked up a speeding destroyer which had several hours' start on him. This experiment was conducted to familiarize the aviator with the lane followed by steamships in crossing the Atlantic Ocean. Other experiments have proved, naval experts say, that Bellinger is the logical man to attempt the flight for the American Navy.

Captain Roy N. Francis of the Army Air Service has been placed in charge of the Army's attempt. He pins his faith to the land type of machine, and it is rumored that a special machine is nearing completion at the Glenn L. Martin factory for this effort.

On March 21, Captain B. B. Lipsner, former Chief of the Aerial Mail Service, announced that Captain James V. Martin had placed at his disposal the newly perfected Martin machine, in which Lipsner says he will attempt a trans-Atlantic flight.

Captain Lipsner says he will take the Azores route, following the same course taken by President Wilson in the George Washington, and that he hopes to start in a week if arrangements can be perfected whereby the Navy Department will picket the route.

The Lunstedt-Hanning machine, constructed by the Witteman-Lewis Company, has undergone several tests recently and Capt. Hugo Lunstedt hopes for an early effort at the Atlantic trip.

The British Efforts

The British plans so far announced include two efforts with land machines, one with a flying boat and one with a large dirigible.

A secretly built aeroplane, accompanied by Harry G. Hawker, as pilot, and Commander Mackenzie Girve, Royal Navy, as navigator, was shipped from England on March 18 to St. John's, N. F., whence it will start at the earliest possible moment in an attempt to win the Daily Mail prize of $50,000 for the first machine to fly across the Atlantic.

The machine is a Sopwith two-seater biplane, with a 375 horse power Rolls-Royce engine.

Pilot Hawker said he believed the flight would occupy about nineteen and one-half hours. The machine, he added, had flown 900 miles in nine hours and five minutes on one-third of its petrol capacity, and is capable of maintaining a speed of 100 miles an hour for twenty-five hours.

Hawker won the British Michelin Prize for 1912 by a continuous flight of eight hours and twenty-three minutes. He has made many long distance flights along the British coast. He established a world's altitude record of 28,500 feet in 1915. Newfoundland, the nearest North American point to Europe, involves a flight of about 1,900 miles. Aviator Hawker is an Australian and is considered well qualified for the attempt.

The flying boat "Porte," which is named after Lieut. Col. John C. Porte, who designed it, has been shipped on a vessel across the Atlantic for the purpose of making from Newfoundland what may be practically described as the British official attempt to fly over the Atlantic.

The Porte machine comes from the Government workshop, and will carry the hopes and blessings of the Air Ministry. The Porte boat, as illustrated on another page of this issue, is the largest flying boat so far constructed by the British Air Ministry.

A British supertriplane, which will probably prove to be the biggest aeroplane in existence, is slowly nearing completion. The London *Chronicle* learns from one of the officers concerned in its construction that the machine was originally designed for bombing purposes, but is now being adapted to commercial use, and is expected to make its first flight under control of Captain Dunne at an early date. Its capacity is enormous, and, although the inside petrol tanks will limit the number of passengers to fifty, future machines may carry as many as 100. Reports state that the machine is a product of the Whitehead factory. One of the ambitions of the designers is a flight across the Atlantic.

Great Britain's biggest airship, the one with which an attempt to fly across the Atlantic is to be made shortly, rose for her first trial flights on March 19.

Swaying gently in a strong head wind she rose immediately and at 300 feet started eastward at seventy miles an hour.

Some months ago the British Admiralty placed orders for similar ships with two large contracting firms—Beardmore, on the Clyde, and Armstrong-Whitworth, at Barrow-on-Furness. The latter won the strenuous race to be first in the air with the R-33.

The airship, which is of the rigid type, was constructed for war purposes, the sinister indications whereof are manifested by openings in the underbody through which can be dropped four 800 pound and sixteen 120 pound bombs, and by provision in the upper works for eight guns.

The ship carries gasoline for an eighty hour flight at an average speed of sixty miles an hour. There are five twelve cylinder engines of 250 horsepower each. One of these is forward, one on each side of the cabin and two are aft, the latter driving a propeller nineteen feet in diameter, while the single engines drive sixteen foot propellers.

The French Efforts

It is known that the Farman Company is working on a large type of land machine for entry in the trans-Atlantic journey. Nothing has been divulged concerning the details of the machine, but it is regarded as possible that it will be similar in type to the "Aerobus" which this company recently flew with passengers from Paris to London.

The Italian Efforts

The well-known Italian inventor Gianni Caproni is constructing a huge triplane for the trans-Atlantic flight. It is said to be the largest machine ever attempted. When finished it is expected it will have facilities for carrying one hundred passengers. No definite date has been announced for the initial test, but it is expected early this spring.



THE NEWS OF THE WEEK



Thomas-Morse Biplane in Fast New York to Ithaca Flight

Ithaca.—A Thomas-Morse biplane, piloted by "Tex" Marshall and carrying a reporter for the *Sun* as passenger, reached this city late in the afternoon of March 20 after covering 200 miles from Hazelhurst Field, Mineola, in 150 minutes.

The trip was made on the direct line to Ithaca, the pilot steering a course above the rough country of northern New Jersey, where the only possible landing place in case of emergency would have been a lake or river. For this reason aeroplanes generally keep clear of this section, and the flight is said to have been the first ever made between New York and Ithaca.

Two Thomas-Morse planes, each equipped with a LeRhone rotary motor of 80-horsepower, left Mineola at 3.15 in the afternoon. After circling to a height of 2,000 feet both planes, the second piloted by Paul Wilson and carrying as a passenger a reporter for the New York *Times*, crossed the Sound, continuing to rise as the Hudson was passed and the Jersey plain reached. A wind from the northwest with a velocity of 40 miles made it necessary to head the machines almost due north to overcome the drift.

At Port Jervis, one hour after the start, the planes were still rising, and a little later the highest altitude of the trip, a little over 8,000 feet, was attained. Forty minutes later Lanesboro, Pa., was passed. "Tex" Marshall kept unerringly on the course, and when Binghamton was reached the dangerous part of the trip was over. The landing was made without difficulty. The second plane was compelled to descend at Binghamton owing to lack of gasolene.

Buying Dirigibles From England

Washington.—Both the Army and Navy are purchasing non-rigid dirigibles in England. One of these lighter-than-air craft, a new type in this country, has reached this country and will soon be put together. The Army is constructing a large hangar for such craft at Langley Field.

Aeroplanes to Combat Mexican Bandits

Owing to the many attacks by bandits which have been made upon paymasters of companies operating in Mexico several organizations are preparing to have the payroll carried by aeroplane from the main office to the various field camps. Returned soldiers who have been in the flying service will act as pilots of the machines. Whether this will entirely circumvent bandit raids on paymasters is a question. The resourceful Mexican bandit may decide to be as progressive as the companies themselves and take kindly to the sport of hunting paymasters with anti-aircraft guns.

Transatlantic Telephony From Belmar to Brest and Glace Bay to Carnarvon

Washington. — Wireless telephone messages were sent daily to the President's ship, the George Washington, while on her way to Brest, and the voice of the speaker was clearly heard when the ship was at anchor at Brest, according to naval officials. The Belmar Transatlantic Station in New Jersey using the Alexanderson alternator was used for transmitting.

At the same time, wireless telephone communication was successfully established between Glace Bay, Nova Scotia, and Carnarvon, Wales.

17th Aero Squadron Downed 65 Enemy Planes

New York, N. Y.—The 137th Aero Squadron, commanded by Lieutenant J. T. Heckel, of Rochester, and the 17th Aero Squadron under Major S. B. Eckert of Philadelphia, returned aboard a transport late in March. The 17th did most of its work with the British at Cambrai. Its report is 65 enemy planes. Seven of the fliers were decorated. On one occasion a combat group flew over Dunkirk and bombed the German aerodromes, destroying many planes, and killing, it was estimated, 30 enemy pilots and 120 men.

Senator Henderson Uses Air Route

New York, N. Y.—Senator Charles B. Henderson of Nevada flew from Washington to the Mineola field in an aeroplane piloted by Major W. C. Ocker of the United States Air Service. The flight, which took two hours, was made in a De Haviland machine equipped with a 400-horsepower Liberty motor. Senator Henderson made the return trip by air the following morning.

General Crowder Flies to Duty at Havana

Havana.—Maj. Gen. Enoch F. Crowder, Judge Advocate General of the American Army, who had been invited to Cuba by the Government to revise the election laws, arrived at Havana from Key West by seaplane. After landing, General Crowder went aboard the American cruiser Cincinnati. The plane carrying General Crowder was escorted by another plane.

Col. Bishop Ill

Roanoke, Va.—Col. William A. Bishop, famous Canadian aviator, was operated upon for appendicitis here. He was stricken as he was preparing to deliver an address. His condition was reported to be satisfactory.

Baltimore Seeks Transatlantic Flight Fame

Baltimore, Md.—William H. Logue, Jr., Industrial Commissioner of the Board of Trade of Baltimore, has a check for $1,000 which he wants a deposit as a starter on a fund of $100,000 with which to finance an overseas aeroplane flight from Baltimore to Europe.

Mr. Logue says a transatlantic flight from Baltimore will make this city the most talked-of place in the world. The flight could start, he says, from the Chesapeake Bay and Maryland aviators—men who have flown above the battlefields of Europe, who have destroyed German planes and bombed German munition factories—could man the machine. He wants to make the flight as much of a Maryland proposition as possible. The machine could be built in Baltimore, he declares, though the engines would have to be procured elsewhere.

Aircraft Can Be Sold to Balkans

Washington, D. C.—The War Trade Board announces the modification of trading restrictions covering trade with all ports of the Adriatic and territory adjacent thereto, including Albania, Montenegro, Croatia, Slavonia, Bosnia, Herzegovina, and Dalmatia.

A special license for shipment of aircraft of all kinds, including aeroplanes, airships, balloons and their component parts, together with accessories and articles suitable for use in connection with aircraft, must be obtained from the Board.

Augustus Post Enthusiastic Over Future of Aeronautics

Albany, March 21.—Consummation of a transatlantic air trip within the next thirty days was predicted by Augustus Post of New York City, secretary of the Aero Club of America, to-day, at the final session of the conference of general commercial organizations of the State. Mr. Post further prophesied that "They will be hitching giant dirigibles soon to New York City skyscrapers to take on and off passengers"; that seal and whale fishing would be promoted by the aeroplane, and that hereafter the possibility of an airman being lost in unknown stretches of land or water would be obviated.



Congressional Committee now in Europe to study aircraft problems. From left to right: W. R. Green of Iowa; A. T. Smith of Idaho; W. A. Ashbrook of Ohio; John E. Baker of California; C. W. Ramsayer of Iowa; Burton L. French of Idaho; and Hatton F. Summers of Texas

Mr. Post told of a device now near perfection which will keep the airman's route mapped out over an area of many thousands of square miles.

"They have been experimenting successfully with a new non-inflammable gas, and when it is ready to be commercialized they will be building 1,000-feet dirigibles which will have a cruising radius of at least 20,000 miles. These dirigibles can be fitted up for pleasure parties and with a roof garden and balconies. They will be extensively used, not only for pleasure purposes, but also for commercial uses."

He declared that within a few years there will be thousands of air tourists in New York State, and that with the Atlantic successfully crossed there will be established mail and passenger routes from this country to Europe.

British Dirigible Flies 1285 Miles in Severe Storm

London, March 22.—A record-breaking long-distance flight over the North Sea was performed by a British non-rigid airship during the last few days.

The voyage, which took the form of a circuit embracing the coasts of Denmark, Schleswig-Holstein, Heligoland, North Germany and Holland, was characterized by extremely unfavorable weather conditions. The total length of the round trip was 1,285 miles, and the time consumed was forty and one-half hours.

So violent was the wind during the last stage of the voyage that the crew had the greatest difficulty in controlling the airship. The flight was particularly noteworthy in view of the fact that the trip was carried out entirely over the sea. It is the longest non-stop sea voyage made by any British aircraft, and, as far as is known, is the world's record for non-rigid airships.

Interallied Commission Favors Adopting Marine Rules for Aircraft

It appears probable that all air vessels will have to obey rules similar to those laid down for maritime shipping, according to a dispatch to the New York *Sun*.

Passing on the right hand will be a universal rule. At night machines will be compelled to carry front, rear, and side lights. Aerial "roads" will come into use in much the same way as did land roads, merely from custom. Various routes naturally have been formed by past flying, and others will follow gradually. As soon as a certain route is seen by the authorities to be frequented landing stages, guiding lights at night and visible signs for the day will be established.

The commission also is considering what qualifications will be necessary before a driving license for personal conveyance and for carrying paying passengers will be granted. The pilot's certificate has been of varying standard in the past. This is to be changed. It is probable flying tests in the future will be more difficult than they were for war pilots, and it may be that two certificates will be authorized, first that of an apprentice, allowing the holder to fly within a restricted area, and then the certificate of a finished pilot.

A standard medical certificate will also have to be possessed by a pilot. In the past health qualifications varied with the climatic conditions of the country in which the flying was to be done; the new health test will qualify the pilot for flying the world over.

The British proposal in regard to frontier control seems to find general favor. The French, however, to save time in the new organization, appear to have decided to adopt the D. C. A. (defence centre avions) system, which was used during the war. It is certain it will be an international agreement that all planes passing a frontier will be obliged to land in specified aerodromes on the frontier line to have papers and cargoes examined.

The commission seems still in difficulty in regard to flying regulations to be imposed on enemy countries. It is very difficult to be sure that peace-time planes will not be able to be transformed in a short space of time into war machines. Yet it is rather hard to guarantee that if flying is prohibited there the order will be obeyed.

The possible outcome is that the Allies will take a longer lease on all commercial aerial lines in Germany. That would prevent the growth of flying on a large scale for a certain period. Such an agreement would necessarily have to be a clause in the peace treaty.

Original Discharge Papers No Longer Required to Obtain $60 Bonus

Washington, D. C.—The discharged officers and enlisted men entitled to sixty dollars bonus under act of Congress approved February 24, 1919, who do not wish to forward their discharge certificate to the Zone Finance Officer, Washington, D. C., may furnish a certified copy thereof under the following conditions:

"The copy will be a literal, full and complete copy of the original, and will contain both printed and written matter of every nature and description of both sides of the original discharge certificate. This complete copy, together with the original discharge and a letter addressed to the Zone Finance Officer, Lemon Building, Washington, D. C., stating the soldier's service since April 6, 1917, the date of last discharge



Lieut.-Commander Patrick N. L. Bellinger, who will pilot the Navy Flying Boat in the Trans-Atlantic Flight

and their present address, to which they desire their bonus check to be sent, will be presented to the nearest recruiting officer of the Army, who will make and sign a certificate in the margin on the back of the original discharge paper in ink, or stamped with indelible ink, reading as follows:

"A true copy of this discharge certificate has been made and attested to by me to enable soldier to obtain bonus.

"This officer will also place a certificate on the copy of the discharge that is to be forwarded to Washington, D. C., certifying that the copy is an exact, true and literal copy of the discharge.

"Officers signing certificates will show rank and station. After this certificate has been made the original discharge will be returned to the soldier and all other papers will be forwarded by the recruiting officer to the Zone Finance Officer, Lemon Building, Washington, D. C., for payment."

Senator W. B. Henderson to Take First Flying Lesson Up in the Air

With a United States Senator as the first pupil, a new system of teaching pleasure-flying without months of preliminary groundwork, physics and



Harry G. Hawker, who will attempt the Atlantic flight in a Sopwith land machine

chemistry, hitherto required of all aspirants for a pilot's license, will be tried out at Bolling Field, Anacostia, next week.

Senator H. B. Henderson, of Nevada, who recently made several trips in army aeroplanes from Washington to New York as a passenger, will be the first candidate for a pilot's wings that ever took his first lesson "in the air." Senator Henderson became so interested in the flying game as a result of his recent flights that he decided to learn to operate an aeroplane.

Beginning next week Senator Henderson will begin his flying lessons under the instruction of Major William C. Ocker, U.S.A., Department of Military Aeronautics, using a De Haviland plane of the Bluebird type, equipped with dual control. The senator will be thrown on his own resources once the aeroplane leaves the ground, just as the small boy is thown into the water over his head and told to "swim or drown."

Flighty Musical Comedy By Rockaway Airmen

Naval aviators of the station at Rockaway Point, New York, will play what they call "a syncopated satire in three acts," called "Hello Below." It was written by Ensign Vaughn Miller, and the cast includes 125 members of the Rockaway Point station. It deals with the training of airmen. The boys hope for a Brooklyn engagement and have designs on Manhattan if the show makes a hit in Rockaway, where the first performances are booked.

Eddie Stinson Tests Ace Plane

New York, March 25.—Eddie Stinson tried out the Ace Scout Plane built by the Aircraft Engineering Corporation of New York at their field at Central Park, L. I., to determine if the little machine would meet his requirements for an exhibition plane. Stinson "took off" in an easy climbing turn, and after trying the controls, performed a series of hair-raising stunts in the little machine.

Bureau of Mines Studied Aircraft Fuel Problem

Washington, D. C.—During the war the Bureau of Mines, Department of the Interior, made strenuous efforts to find a special fuel for aeroplanes that would be superior to others already in use. Of the numerous products and mixtures obtained some were originated by the bureau engineers and chemists, others were suggested by outside interests. Through its own experiments or by cooperation with other organizations, notably the research division of the Dayton Metal Products Co. and the Bureau of Standards, it was possible to establish the fact that certain types of fuels had elements of superiority that had not before been noted or appreciated. Of the fuels proving most satisfactory, gasoline refined from the crude petroleum of certain producing fields was distinctly superior to the type most extensively used. The blending of moderate proportions of benzol with gasoline was found to be distinctly advantageous, and motor fuel of this type would undoubtedly have been employed for military purposes if the war had continued much longer. It is believed that through the proper use of benzol and other distillates derived from coal, it may be possible to embody features in the design of internal combustion motors that will notably increase their efficiency. Benzol and other coal-derived fuels are already being sold for use in automobiles and are believed to be giving satisfactory results even with present types of motors.

The bureau was particularly interested in a special fuel tested in cooperation with the Dayton organization and named "hecter". This fuel, which was a mixture of cyclohexane and benzol, gave indications of marked superiority over any other product tested and should, unless unforeseen deficiencies appear, prove ideal for the military aviation service. In some experimental fights this fuel has given 10 miles an hour more speed. It is not certain that the cost of production will ever be low enough to permit its use in peace times, but it is planned to complete the work of obtaining comprehensive information regarding all of its possibilities and to publish reports on the subject in cooperation with the engineers of the research division of the Dayton Metal Products Co.

Transport Arizonan Brings Home Twelve Aero Squadrons

The Transport *Arizonan* sailed from Bordeaux March 18 and is due to arrive at New York April 2 with the following troops: 640th Aero Squadron, 5 officers, 145 men; 257th Aero Squadron, 3 officers, 151 men; 101st Aero Squadron, 4 officers, 143 men; 43d Aero Squadron, 1 officer, 148 men; 37th Aero Squadron, 3 officers, 125 men; 174th Aero Squadron, 2 officers, 151 men; 172d Aero Squadron, 3 officers, 161 men; 19th Aero Squadron, 5 officers, 148 men; 21st Aero Squadron, 3 officers, 147 men; 30th Aero Squadron, 5 officers, 129 men; 31st Aero Squadron, 3 officers, 133 men; 33d Aero Squadron, 3 officers, 135 men; 1 casual officer, Air Service; other casuals; civilians, 5. Also 1 Naval enlisted man.

The AIRCRAFT TRADE REVIEW

Caswell Predicts European Demand for U. S. Parts and Accessories

Never before has foreign trade opportunity knocked harder at the doors of American manufacturers than it does to-day. This seems to be the consensus of opinion among those who have watched the march of events in the international commercial arena since the signing of the armistice, says Mr. F. B. Caswell, the energetic sales manager of the Champion Spark Plug Co.

The conditions which have practically excluded European competition during the last two years have placed us in a favorable position to secure, for all time, our rightful share of the world's trade in many of our most important commodities. But it should be borne in mind that the circumstances under which we have lately made such gigantic strides as an



F. B. Caswell, sales manager of the Champion Spark Plug Co.

exporting country will soon cease to exist and will be followed by a period of competition such as the world has never before known.

The quality of our products and of our packing as well, our selling methods and our representatives—will all be pitted against the best that can be developed by those who, for centuries, have studied the art of cultivating good will. It would be foolish to suppose that the Anglo-Saxon, Teutonic and Latin peoples of the old world are going to relinquish their hold upon those markets without a struggle.

The principles of quantity production which form the keynote of our success are no longer a mystery to our conservative friends across the sea. The experience gained by the entente countries during the last two years of the war taught them many things—among them, the advantages of scientifically worked-out reduction methods—at which American manufacturers have always excelled. It would, therefore, seem clear that in order to successfully compete in many lines we will have to be satisfied with a small margin of profit.

To those who are interested in the manufacture of aircraft accessories, the outlook is particularly bright. The shipment of American-made aircraft and motors to Europe during the war has served to emphasize more than ever the ingenuity and skill of American inventors. When conditions get back to normal, there should be a ready sale for many of the accessories and parts with which these vehicles are equipped. This is particularly true if the accessories referred to are properly advertised in the language of the people to whom they are to be sold and intelligently placed within their reach.

Personal Pars

Charles M. Manley, president of the Society of Automotive Engineers, has resigned as vice-president of the Curtiss Aeroplane Corporation and returned to New York, where he will continue the development of the Manley hydraulic transmission.

M. H. Blank has been appointed chief engineer of the Lynite Laboratories of the Aluminum Castings Co., Cleveland. He was recently honorably discharged as captain in the army. Previous to entering military service he was assistant engineer of the Premier Motor Corp.

Standard Parts Now in Own Building

Cleveland—On the first of the month the Standard Parts Co. moved from its central offices, which include the executive and supervisory staff, bookkeeping, advertising and contracting departments, to the Standard Parts Building on Walnut Avenue at East Eleventh Street, which has just been completed.

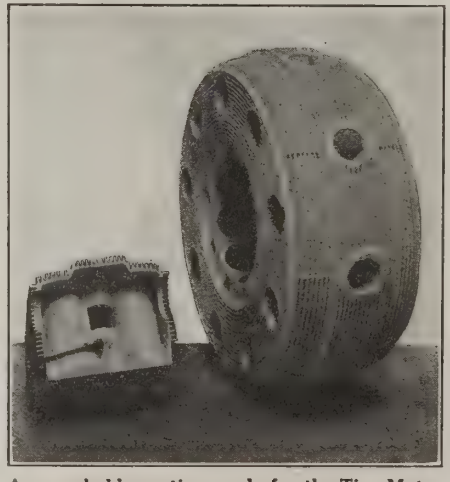
Aeronautic Committee Sails for Europe

Washington—A Congressional committee to study aeronautics in Europe has sailed with Secretary Daniels. The committee comprises W. R. Green, Iowa; A. T. Smith, Idaho; W. A. Ashbrook, Ohio; John E. Raker, Cal.; C. W. Ramseyer, Iowa; B. L. French, Idaho, and H. W. Sumner, Texas.

Aluminum Castings Co. Makes 18-Cylinder Rotary Motor Casting

Fairfield, Conn. — An exceptionally difficult piece of casting work was turned out at the Fairfield plant of the Aluminum Castings Co., under the personal supervision of Mr. J. F. Deiter, the plant manager for the Tipps Motor Co., of Woonsocket, R. I. This is an 18-cylinder rotary motor of radical design, described in the March 17 issue of Aerial Age. There are 26 ribs on the end of this casting and 15 on the side, the ribs being 1½ inches high and 3/16 of an inch thick. The castings were 48 inches in diameter and 17⅜ inches high. The total weight, ready for shipment, is 585 pounds.

Mr. Tipps informed Mr. Deiter that the castings he turned out were superior to the products turned out in the Belgian factories, where Mr. Tipps made his earlier experiments.



A remarkable casting made for the Tips Motor Co. by the Aluminum Castings Co.

J. G. Utz Chief Engineer for Standard Parts

John Gilmore Utz, director of the Engineering Department of the Standard Parts Company, has been one of the moving spirits in standardization in the automotive world.

Mr. Utz is a Cornell graduate and began his practical training while attending college, working one summer for Mr. Elmer Sperry on his electric car.

After graduation Mr. Utz became chief draftsman for the Olds Motor Works. Before leaving this concern he was promoted to the position of assistant engineer. In 1907 Mr. Utz joined the engineering forces of the Autocar Company and designed the truck which is still



J. G. Utz, chief engineer of Standard Parts Co.

in modified form being manufactured by that company.

At a later date Mr. Utz designed the light weight Chalmers Thirty, which was at that time one of the largest selling cars on the American market. Following this, Mr. Utz was identified with the Abbot Motor Company and the Perfection Spring Company.

Early in his career Mr. Utz became interested in the matter of standardization, being identified with the mechanical branch of the Association of Licensed Automobile Manufacturers, which concerned itself with the standardization of spark plugs, screw threads, etc. This work was continued by the Society of Automotive Engineers and has often been mentioned in the columns of Aerial Age Weekly.

Mr. Utz was successively a member of the Council and Chairman of the Standard Committee. In his latter capacity he was brought much in contact with governmental activities, when, upon the declaration of the war, the development of our motor transport became one of the large and urgent undertakings. Mr. Utz became supervisor of inspections in September, 1917, and in December of that year was made supervisor of engineering also. He retained his civilian status. The work ultimately led to his having charge of a party of Americans sent to France last May to assist in the organization of the work of the Motor Transport Corps, which was and is a big factor in the great showing of the American Expeditionary Forces. Mr. Utz is of the opinion that we will never return to pre-war standards or perhaps what might more aptly be termed pre-war lack of standards. Its value will become even more apparent when it is applied to the salvage of the 50,000 automotive vehicles, which were in commission at the close of the war.

The service which Mr. Utz has rendered toward bringing about this universal standardization will be a lasting benefit to the industry.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service

Louis T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service



PILOTS

Ira O. Biffle
Dana C. DeHart
Edward V. Gardner
Lawton V. Smith
Leon D. Smith
Robert F. Shank
Irving Graeb

John A. Jordan, Superintendent, Western Division
Trent C. Fry, Manager, Belmont Park, L. I.
Charles I. Stanton, Manager, College Park, Md.
John M. Miller, Manager, Bustleton, Pa.
O. J. Sproul, Manager, Chicago, Ill.
C. E. McMillan, Manager, Cleveland, Ohio
August Carlson, Manager, Lehighton, Pa.
Harry F. Powers, Manager, Bellefonte, Pa.
William Lindley, Manager, Clarion, Pa.
J. P. Edwards, Manager, Bryan, Ohio
Charles N. Kight, Special Representative

RESERVE PILOTS

Lester F. Bishop
Dan Davison
C. C. Eversole
E. A. Johnson
D. I. Lamb
Frank McCusker
E. H. Lee
Lyman Doty

CHIEF MECHANICS

Frank Tower
Edward C. Radel
Chas. C. King
H. E. Fremming
Albert Cryder

Post Office Announces New Speed Record for Aerial Mail

Washington, D. C.—D. H. De Hart, pilot, brought in the air mail from New York on March 20 in 2 hours and 14 minutes after a checkered trip at different altitudes to dodge bad winds and patches of rain and snow which lay in his course. He covered the stretch from New York to Philadelphia at the rate of 110 miles an hour, and from Philadelphia to Washington at 90⅓ miles an hour with a full load of mail.

On March 15 Aviator Ira O. Biffle made a remarkable trip through rain and fog from New York to Washington in 2 hours and 7 minutes. The trip from New York to Philadelphia was made at the rate of 90 miles in 48 minutes, or at the rate of 112 miles an hour, and from Philadelphia to Washington in 1 hour and 19 minutes, or at the rate of 97 miles an hour. He carried a load of 281 pounds of mail. Going against the storm from Washington to New York the speed of the mail plane was held down to an average of 51 miles an hour.

On Monday, March 17, Aviator E. V. Gardner flew from Washington to New York with the mail in 2 hours and 5 minutes, covering the run from Washington to Philadelphia at the rate of 98.4 miles an hour, and from Philadelphia to New York at the rate of 114 miles an hour. The trip from New York to Washington against the strong head wind was at the rate of 57 miles an hour.

On March 11 Aviator E. H. Lee brought the mail into Washington from New York at better than 100 miles an hour, flying from New York to Philadelphia at the rate of 102 miles an hour, and from Philadelphia to Washington at the rate of 101 miles an hour. The total elapsed time of the trip was 2 hours and 8 minutes with a mail load.

Aviator Leon H. Smith brought the mail to Washington on March 12 in 2 hours and 7 minutes flying time, covering the distance between New York and Philadelphia at the rate of 98 miles an hour and between Philadelphia and Washington at the rate of 110 miles an hour.

Peru to Have Aerial Mail Service

Lima, Peru.—The government has invited American and European bids for starting an aerial mail service in Peru.

British Officer Predicts Bright Future for Aeronautics

"Whether it be an Englishman, an American, a Frenchman or an Italian, it is certain that before many months a successful flight across the Atlantic in an aeroplane will be an accomplished fact," said Lieut. A. R. Hooper, a British aviator. "In my opinion, it would be possible now to fly across the Atlantic in a dirigible. I can recall the attempt made by Walter Wellman several years ago and its failure. Today there is not the slightest chance of failure, in my judgment. Dirigibles now built in England can fly across the Atlantic without stopping.

"Within a quarter of a century, in all probability in less time, I believe we shall have regularly established aeroplane routes between the cities, as we have railroads now. The development of the aeroplane in the four years of war has been marvelous. They are building now in England a machine that will make a vertical ascent into the air at a speed that would have amazed one two years ago. I do not believe it will be five years before the mails will be carried by aeroplane between all the great cities. Indeed, I am sure that within less than a half decade Washington will be receiving regularly letters from New York in less than two hours from the time they are mailed.

"One of the most interesting developments that came under my personal observation during the war was the taking of photographs from a high altitude. Many of the aerial photographers in the beginning found that after they had made their exposures when they came to develop their plates were black. An American discovered that this was due to the haze that screens the earth, and he found that by placing an apparatus on his machine he could penetrate the haze with his lens, and after that picture making was simple."

Aerial Terms of Peace Commission

From the progress made by the sub-commission of the Peace Commission, it appears that the proposal is to subject traffic by the air routes to virtually the same regulations as that by ground routes. It is planned to protect the customs regulations of the various countries by establishing landing grounds at the frontiers and making it obligatory for pilots to land before passing from one country to another in order that the customs formalities may be complied with at such landing points.

The aerial terms remain practically unaltered. Germany will be allowed no military or naval air force, except the maximum of one hundred seaplanes until October 1, which are to be employed for destruction of submarine lines, with a personnel of 1,000 men. No aerodrome or dirigible shed will be permitted within the 95 miles east of the Rhine, or west of the eastern frontier, or of the Italian and Czecho-Slovak frontiers. All the existing aviation grounds within these areas are to be demolished and the ground plowed up.

Free aerial passage and the right of landing will be given by the Germans to Allied aircraft until the complete evacuation of German territory by the Allied troops. Until the signature of the final treaty of peace, the manufacture or importation of anything connected with aeroplanes is forbidden. All the military aviation materials of any kind whatever is to be handed over.

Lighter Than Air Service Train Service Soon, Says Dr. Bell

Holyoke, Mass., March 22.—Train service in the air may be expected at no distant date, according to Dr. Alexander Graham Bell, inventor of the telephone, who spoke today before a women's club here.

He declared a lighter than air machine is best adapted for commercial purposes, and there was no reason why a fleet of such dirigible cars might not be run, drawn by one machine with motive power.

He predicted that before long it would be possible to have one's breakfast here and supper in Ireland.

Newton D. Baker, Jr., Celebrates Twelfth Birthday By Aeroplane Flight

Washington, D. C.—Newton D. Baker, jr., son of the Secretary of War, celebrated his twelfth birthday on March 13 by making his first flight over Washington in an army aeroplane from Bolling field. He was taken as a passenger by Lieut. Leo F. Post, and after on hour's circling over the city he didn't want to come down. The "joyride" was asked by the boy of his mother as a birthday present.

Capt. Leroy Leopold, engineer corps, Newton's uncle, and Mrs. Frank Baker, wife of Major Baker, brother of the Secretary of War, who has just returned from France, also made the flight as passengers in machines piloted by Capt. Felix Steinhle and Lieut. Thomas Graves.

U. S. Soldiers May Wear Chevrons or Badges for Service in Foreign Armies

Washington, D. C.—The War Department authorizes publication of the following circular:

Circular No. 123.

War Department,
Washington, March 13, 1919.

Chevrons and Badges for Service in Foreign Armies

Officers and enlisted men of the United States Army, who served in the armies of any cobelligerent with the United States in the present war are authorized to wear any chevrons or badges denoting such service which may have been awarded to them by the government of the country in whose army they served.

By order of the Secretary of War:

FRANK MCINTYRE,
Major General, Acting Chief of Staff.

Official:
P. C. HARRIS,
The Adjutant General.

Recent Naval Orders

Lieutenant (junior grade) Charles L. Andrews, to U. S. S. S-1.

Lieutenant (junior grade) Robert A. Fisher, to duty as inspector of engineers material (aero) U. S. N., Buffalo, N. Y.

Lieutenant (junior grade) Earl H. Miller, to duty naval air station, Key West, Fla.

Lieutenant Commander Emory W. Coil, connection with inflation rigging and flying dirigible C-5, Naval Air Station, Cape May, N. J.

Lieutenant (junior grade) G. W. Shaw, to duty naval air station, Rockaway, L. I., N. Y.

Lieutenant (junior grade) F. W. Prescott, to duty naval air station, Pensacola, Fla.

Lieutenant Commander John L. Callan, to duty under chief of naval operations (aviation), Navy Department, Washington, D. C.

Lieutenant C. G. Little, to duty navy air station, Cape May, N. J.

Lieutenant Louis T. Barin, to duty under chief naval operations (aviation), Navy Department.

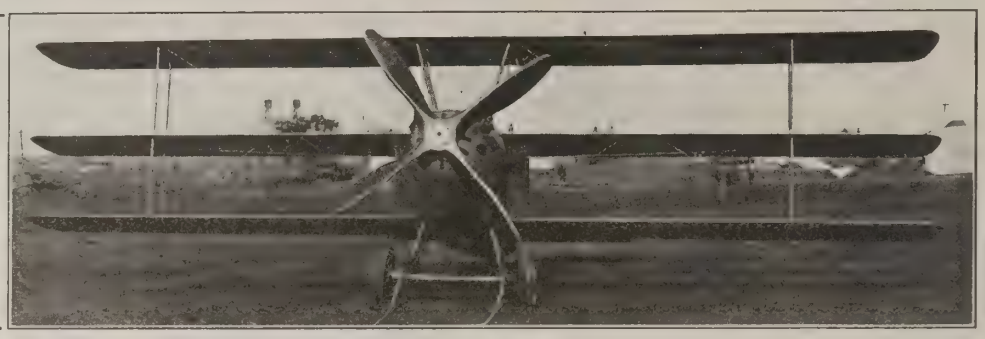
Lieutenant Rufus H. Bush given appointment as naval aviator in U. S. N., November 19, 1918.

Lieutenant Ralph M. Strader to duty navy air station, Pensacola, Fla.

Lieutenant (junior grade) Burr L. Moultrop, to duty navy air station, Rockaway Beach, L. I.

Lieutenant (junior grade) Gilbert W. Douglas, to naval air station, Rockaway Beach.

THE CURTISS MODEL 18-T TRIPLANE



CLOSE attention to the lines of air flow has resulted in the production of a machine which is pleasing to the eye and at the same time mechanically and aerodynamically correct. The fuselage presents an almost continuous contour; the tail units are so set that they appear as natural and expected extensions of the body; the engine cowling and exhaust manifolds complete the unity of the design.

In normal flight the Curtiss model 18-T triplane attains a speed almost equalling that of most machines diving vertically. In recent speed tests the 18-T established the world's record for speed for a successfully controlled continuous horizontal flight.

The machine is designed around the Curtiss Model K-12 aeronautical engine which was described in detail in AERIAL AGE on February 3, 1919. The propeller is practically centered on the engine and fuselage by the location of reduction gears integral with the engine.

The propeller, either two or four bladed, is supplied according to requirements of performance. Viewed from the pilot's seat, the propeller rotates in a clockwise direction.

Standard instrument equipment includes a tachometer, oil gauge, gasoline gauge, and complete set of tools. Additional equipment supplied as ordered.

General Dimensions

Wing span, upper plane	31′ 11″
Wing span, middle plane	31′ 11″
Wing span, lower plane	31′ 11″
Depth of wing chord (upper, middle and lower)	42″
Gap between wings (between upper and middle)	42″
Gap between wings (between middles and lower)	35 9/16″
Stagger	none
Length of machine overall	23′ 3 3/16″
Height of machine overall	9′ 10⅜″
Angle of incidence	0.2½°
Dihedral angle	none
Sweepback	0.5°
Wing curve	Sloane
Horizontal stabilizer—angle of incidence	0.5°

Areas (*Square Feet*)

Wings, upper	112.0
Wings, middle	87.71
Wings, lower	87.71
Ailerons (middle, 10.79; lower, 10.79)	21.58
Horizontal stabilizer	14.3
Vertical stabilizer	5.2
Elevators (each 6.51)	13.02
Rudder	8.66
Total supporting surface	309.0

Loading (*Pounds*)

Weight carried per sq. ft. of supporting surface	9.4
Weight carried per rated horsepower	7.25

Weights; General (*Pounds*)

Net weight, machine empty	1,825
Gross weight, machine and load	2,901
Useful load	1,076

Weights; Useful Load (*Pounds*)

Fuel	400
Oil	45
Pilot and passenger	330
Useful load	301
Total	1,076

Performances

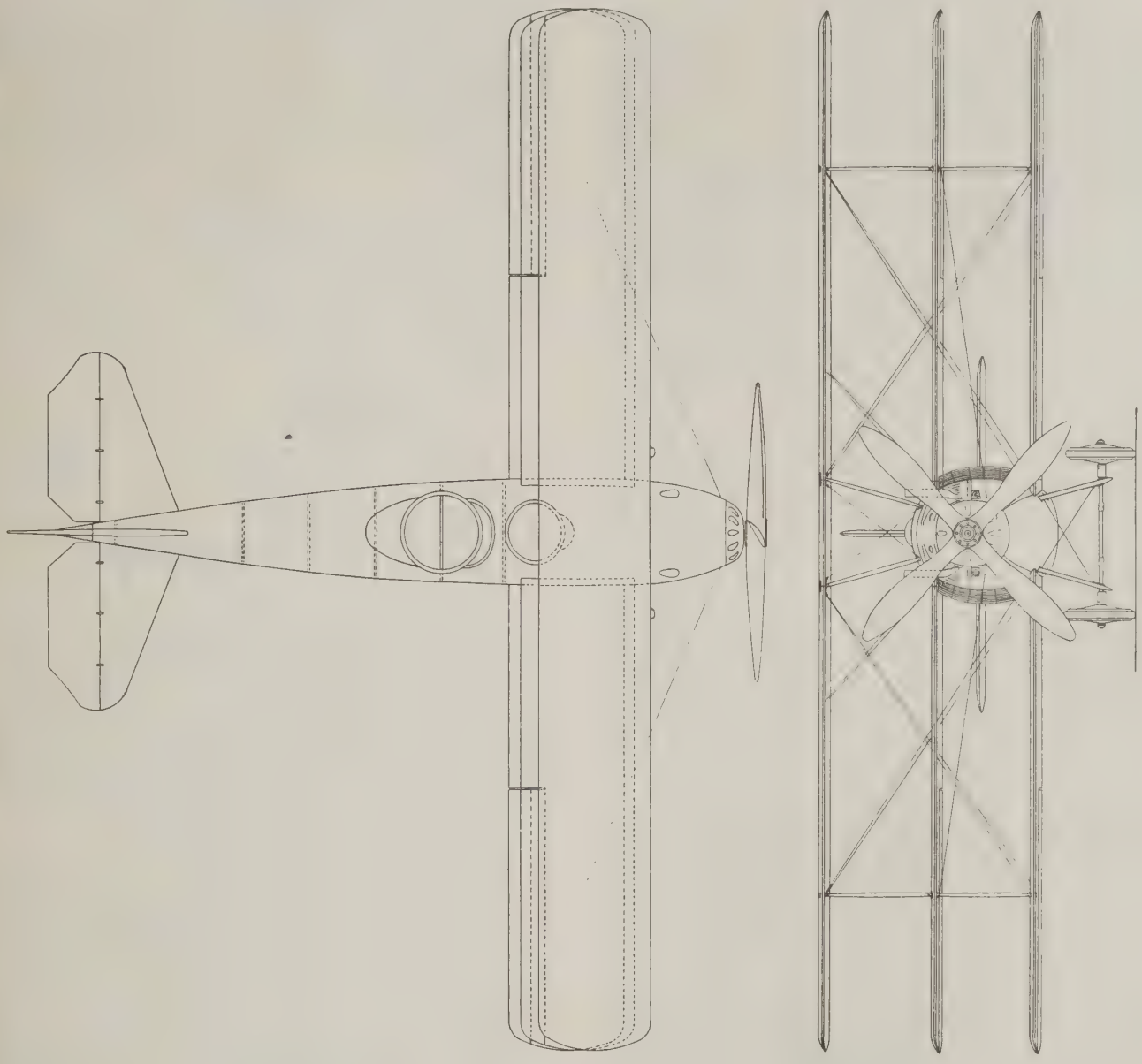
Speed, maximum, horizontal flight	163 M.P.H.
Speed, minimum, horizontal flight	58 M.P.H.
Climbing speed	15,000 ft. in 10 minutes
Maximum range at economic speed	550 miles

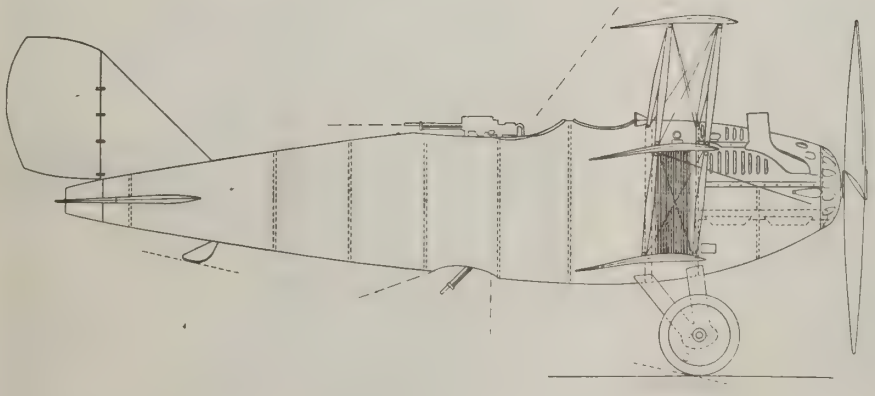
Power Unit

Model K-12—12-cylinder, Vee—four-stroke cycle, water cooled	
Horsepower—(rated) at 2,500 R.P.M	400
Weight per rated horsepower	1.70 lbs.
Bore and stroke	4½ x 6
Weight, without oil or water	680 lbs.
Dead weight per rated horsepower	1.70 lbs.
Valves	Two intake two exhaust per cylinder
Carburetors	Two duplex Ball Aero Carburetors
Cooling	Water-centrifugal pump
Oiling	Pressure feed
Ignition	Two high-tension 2-spark 6-cylinder magnetos
Fuel consumption per hour	36.7 gals.
Fuel tank capacity	67 gals.
Oil capacity provided—crankcase	6 gals.
Fuel consumption per B.H.P. per hour	.55 lbs.
Oil consumption per B.H.P. per hour	.030 lbs.



Three-quarter rear view of the Curtiss Model 18-T Triplane with a 400 H.P. Curtiss Model K engine





CURTISS MODEL 18-T
400 H.P. "K-12" ENGINE
TRIPLANE

Scale of Feet

1 2 3 4 5 6 7 8 9

McLaughlin

THE "LE RHONE" 110 H. P. ENGINE

By G. DOUGLAS WARDROP

General Data

Number of cylinders	9
Bore of cylinder	112 m/m
Stroke	170 m/m
Torque re-action at 1,250 r.p.m.	129 h/p
Torque re-action at 1,200 r.p.m.	127 h/p
Useful h.p. deducting windage	
Useful h.p. at 1,250 r.p.m.	112 h.p.
Useful h.p. at 1,200 r.p.m.	112 h.p.
Petrol consumption at 110 b.h.p.	.765 pint per h.p. per hour
Petrol—specific gravity	.072
Volume of compression space	417 cu. c/ms
Stroke volume of engine	1,672 cu. c/ms
Compression ratio	5 : 0
Rotation of engine facing propeller	anti-clockwise
Lift of exhaust valve	10.5 m/m
Lift of inlet valve	10.5 m/m
Diameter of inlet and exhaust valve	45 m/m
Clearance between rocking lever and inlet valve	1.0 to 1.2 m/m
Clearance between rocking lever and exhaust valve	0.8 to 1.0 m/m
Piston ring cap	0.5 m/m
Clearance between ring and piston groove	0.1 m/m
Magneto rotation	Clockwise
Magneto speed at 1,200	2,700 r.p.m.
Magneto speed at 1,250	2,812 r.p.m.
Magneto advance	20° to 26°
Tachometer speed at 1,200	2,160 r.p.m.
Tachometer speed at 1,250	2,250 r.p.m.
Tachometer rotation	Clockwise
Order of firing cylinders	1, 3, 5, 7, 9, 2, 4, 6, 8
Inlet valve opening past top dead center	30°
Inlet valve closing past bottom dead center	30°
Exhaust valve opening before bottom dead center	40° to 45°
Exhaust valve closing past top dead center	16°
Lubricating oil	castor oil
Lubricating oil specific gravity	.96
Lubricating oil consumption	9 to 10 pints per hour
Weight of engine with oil pump and magneto	323 lbs.

Fixed Part

The fixed part consists of a hollow crankshaft, which is keyed to and supported by the main bearer plate. The main bearer plate is rigidly fixed to the forward support of the aeroplane by means of bolts, whilst the centralizing plate, fixed to the rear support of the aeroplane, carries the end of the crankshaft.

The crankshaft projects in front of the main bearer plate, and the whole of the rotating parts are mounted on its support, but are free to revolve.

Various accessories, viz:—The magneto, the oil pump and the brush holder are carried on the main bearer plate. The carburetor is fixed at the extreme end of the crankshaft, through which passes the vaporized mixture into the crankcase and thence to the cylinders.

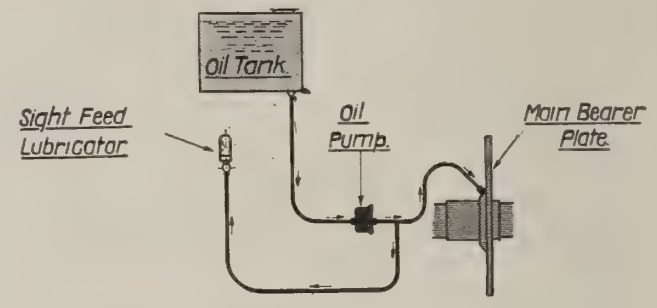
The crankshaft is extended in front by a short end crank.

The lubricating arrangements are entirely contained in the crankshaft.

Rotating Part

The rotating part consists of:—The crankcase, the cylinders, connecting rods and pistons, valve gear and part of ignition arrangements.

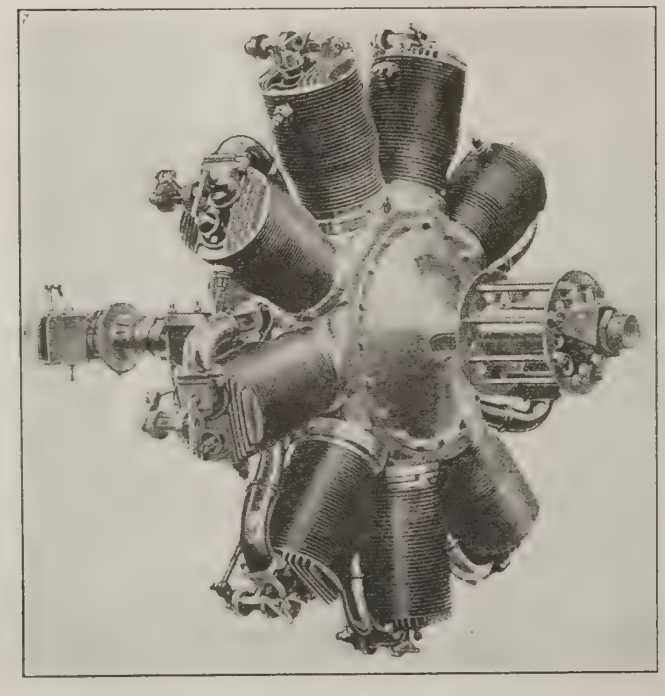
Crankcase:—The crankcase carries a medium nose in front, on which is fitted the propeller hub. On the back of the crankcase is fitted the back cover, to which is secured the cam driving gear wheel and the magneto driving gear wheel and the distributor. The whole turn about the crankshaft on three journal ball bearings. The last of these is of the double row radial and performs the additional function of absorbing the propeller thrust. Refer to Sectional Arrangement.



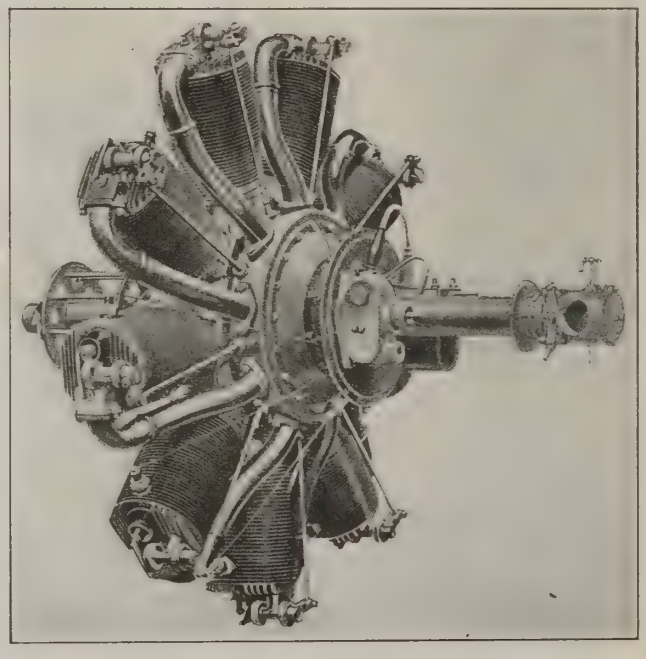
Diagramatic Sketch of Oiling System.

Cylinders

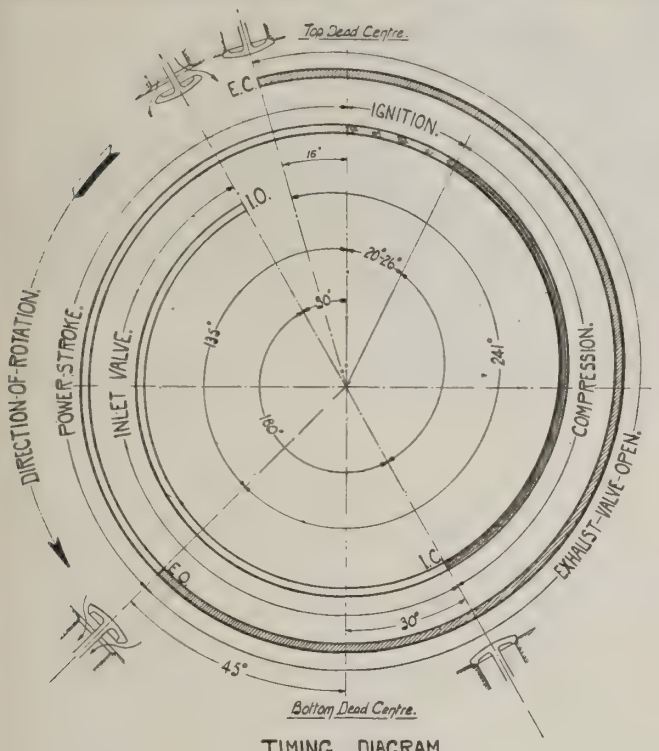
The cylinders are screwed into the crankcase and secured with locking rings. The interior is provided with a cast iron liner, which is put in under pressure. In the cylinder head are situated the seats for both inlet and exhaust valves, which



110 H.P. Le Rhone Engine—Front View



110 H.P. Le Rhone Engine—Rear View



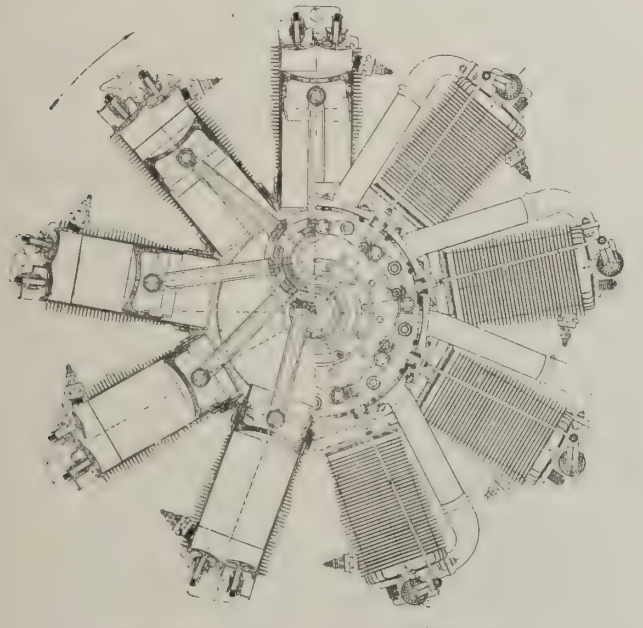
TIMING DIAGRAM.

are interchangeable. The inlet valve guide seating is screwed into the head of the cylinder. These valves are brought back to their seats by very light springs, which ensure their operating when starting up; when up to speed, centrifugal force brings them back to their seats. The valve rocker operates alternately the inlet valve and the exhaust valve, by reason of its oscillating motion in the valve rocker tea piece which is fitted with ball bearings. On this rocker is fixed a lever operated in turn by the valve rod. The induction pipes, each in two pieces, convey the carbureted mixture from the crankcase to the inlet valves.

Connecting Rods and Pistons

The connecting rods are connected to the crankpin by the connecting rod thrust block, which is made in halves running on two ball bearings mounted on the crankpin.

Three sets of three connecting rod heels, each set being of different size, slide in annular grooves lined with bronze, which are provided in the connecting rod thrust block. This arrangement allows the connecting rods to rock relatively to one another. Nine screws hold the halves of the thrust block together.



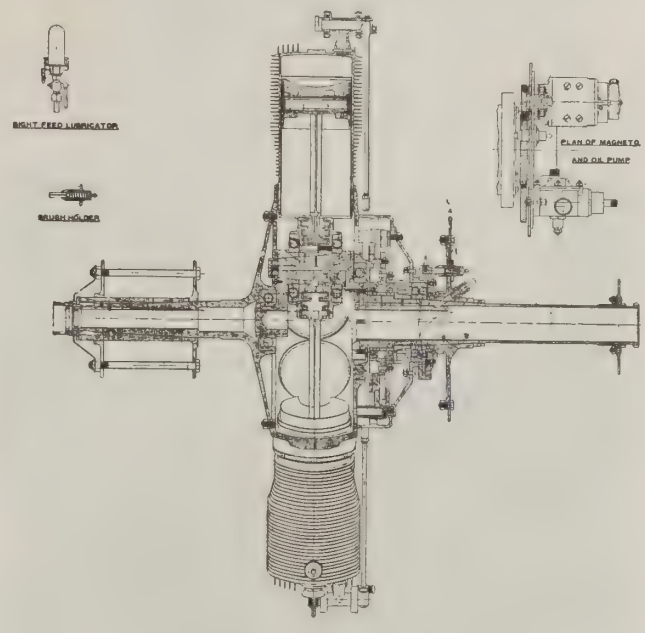
Rear diagram of the 110 H.P. Le Rhone Motor

The pistons are of aluminum fitted with two phosphor bronze bushes. The gudgeon pin is of the floating type and is prevented from rubbing the cylinder walls by means of two circlips, which are fitted into grooves in the bushes. There are five piston rings which are of special steel.

Valve Mechanism

The valve mechanism consists of two cams, one induction cam and one exhaust cam operating nine cam rockers, each connected to its valve rod. The rockers receive oscillating motion caused by contact of the induction cam rollers and the exhaust cam rollers on their respective cams. It will be seen that centrifugal force acting on the valve rod will tend to keep the induction cam roller hard on its cam. This consideration is very important, and the value of it will be understood in connection with the setting of the valve timing. A cam is fitted on each side of the cam boss which is free to rotate upon the ball bearing mounted on the crankshaft. On the back cover is bolted a gear wheel having 54 teeth, which is in mesh with a gear wheel of 60 teeth cut internally, which is mounted on the cam boss to keep the gears in mesh. The ball bearings are mounted eccentrically, the amount of eccentricity corresponding to the difference in the radius of the gear wheels.

The profile of each cam is repeated exactly five times round



Side view diagram of the 110 H.P. Le Rhone Motor

the periphery. This profile combined with the eccentricity and the centrifugal force of the valve rod gives the nine rockers the necessary motion at the moment of opening and closing the valves.

Ignition

To the main bearer plate is attached the magneto, the pinion (16 teeth) of which is driven by a gear wheel which rotates with the crankcase. The magneto is provided with a contact breaker determining the point of ignition, which is the same for all the cylinders. A high tension wire conducts the current to the brush holder, which is also fixed on the main bearer plate.

The brush in the brush holder works on the surface of the distributor, which is fixed to the back cover and has nine separate segments. A bare brass wire is carried from each of these segments to the corresponding sparking plug fitted to the cylinder.

Referring to the order of firing in the cylinders given in Paragraph II, it will be seen that the distributor must only transmit the current alternately and in the order 1, 3, 5, 7, 9, 2, 4, 6, 8, each point of ignition corresponding to the moment when the platinum points of the magneto separate.

Lubrications

The oil pump previously stated is fixed on the main bearer plate the spindle of which carries a pinion also driven by the gear wheel fixed to the back cover.

The worm is cut in the center of the oil pump spindle which drives the worm wheel mounted on the oil pump crank-

(*Continued on page* 177)

SAND TESTING OF AEROPLANES

By ALBERT S. HEINRICH

DURING the last year of the War the United States and foreign Governments spent millions of dollars in sand testing aeroplanes of different types from different designers to determine their structural strength, and correctness of design. Owing to the many different methods of analyzing the stresses in an aeroplane, and also the different type trusses employed in aeroplane design, it has been practically impossible to adapt any one type of truss and apply it to all types of machines, as what proves most satisfactory for one machine will be very unsatisfactory for another, and although the method of trussing the wings of different types of machines has been more or less standard all over the world, the past year has shown some radical changes in design, and the analytical method of determining the stresses and strength of different structures has proven to be most anything but correct in most cases; therefore, it has been necessary to adapt a standard method of sand testing all machines before they are flown or accepted in order to prove the correctness of design and show up any weak parts in the structure. The loading should be applied as quickly and uniformly as possible, and the total elapsed time after the first loading is applied should not take more than two hours, as the time element is often the leading factor in determining the ultimate strength of the structure, as material fatigue from keeping the members stressed and strained too long will often give misleading results.

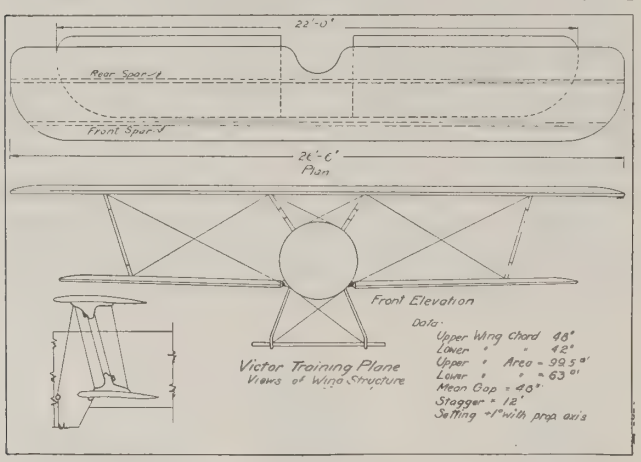


Figure 1—Three views of the wing structure, together with the landing chassis



Figure 5—Machine set at proper inclination, ready for application of sand

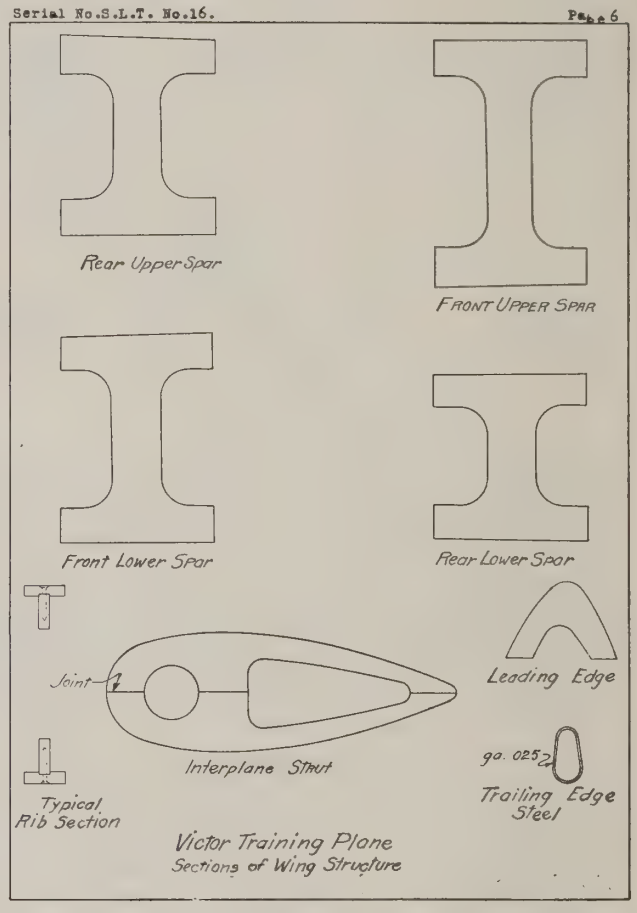
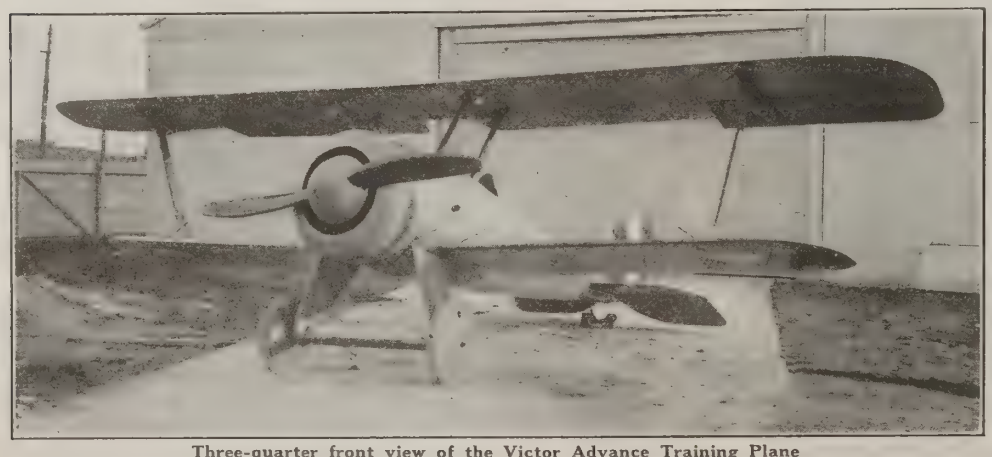


Figure 2—Sections of wing members and one of the large struts

The following tests were conducted at McCook Field, Dayton, Ohio, on the Victor Advance Training Plane, shown in Photos 1, 2, and 3.

General Description and Dimensions

The Victor Aeroplane, built by the Victor Aircraft Corporation, Freeport, Long Island, is a single-seated training biplane, equipped with either a 100 H.P. Gnome or a 90 H.P. Le Rhone motor, with the Gnome motor it makes 115 m.p.h., and with the Le Rhone 110 m.p.h. The total weight with the Gnome motor is 1,235 lbs., and with the Le Rhone motor 1,065. The machine used in this test was built for the Le Rhone motor. Figure 1 shows three views of the wing structure, together with the landing chassis, which connects the lower wing spars in this machine. There are two spars in each wing,



Three-quarter front view of the Victor Advance Training Plane

interplane compression members consisting of single struts with large column heads, connected to both spars, thereby reducing the parasite resistance considerably. The full-size section of one of the large struts is shown in figure 2, and the upper end of one, after failure, may be seen in figure 8 showing the sheet steel end and details of other parts of the structure. The ribs are of very light construction, having plain webs, reinforced by thin strips of fibre fastened by wire staples to each side of the verticals, as shown in figure 3. Full-size sections of ribs, spars, and two edges are drawn in figure 2. Figure 8 also shows a part of one of the single-control masts operating each aileron. This mast has two long arms on the lower surface of the

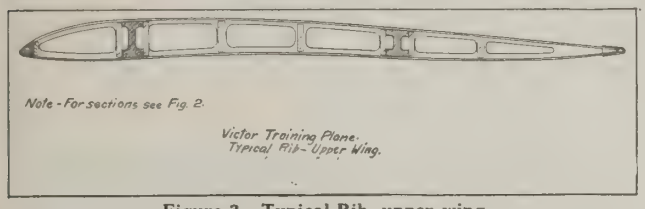
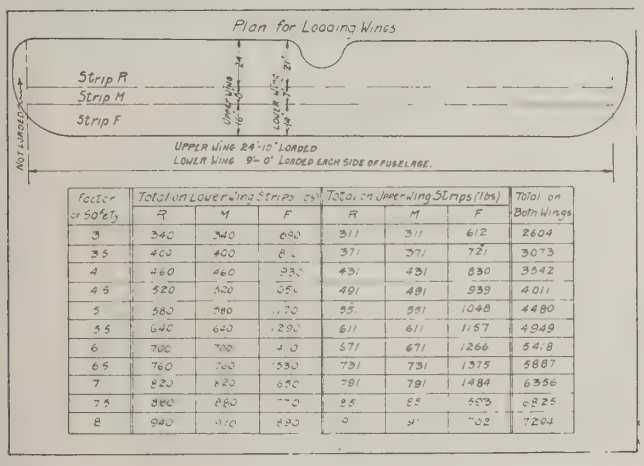


Figure 3—Typical Rib, upper wing

aileron, and the cables pass from the ends of these arms through the lower wing to the fuselage, thus giving a simple, strong control system.

The following is an abbreviated weight schedule:

Body complete	208
Empennage	24
Landing Chassis	51
Lower Wings	45
Upper Wings	70
Interplane Struts	32
Motor, Cowl, Prop, etc	320
Pilot	165
Fuel and Oil	150
Total	1,065 lbs.



Factor of Safety	Total on Lower Wing Strips (lbs) R	M	F	Total on Upper Wing Strips (lbs) R	M	F	Total on Both Wings
3	340	340	690	311	311	612	2604
3.5	400	400	8[illegible]	371	371	721	3073
4	460	460	930	431	431	830	3542
4.5	520	520	05[illegible]	491	491	939	4011
5	580	580	1170	551	551	1048	4480
5.5	640	640	1290	611	611	1157	4949
6	700	700	1410	671	671	1266	5418
6.5	760	760	1530	731	731	1375	5887
7	820	820	650	791	791	1484	6356
7.5	880	880	770	85[illegible]	85[illegible]	593	6825
8	940	940	890	9[illegible]	9[illegible]	702	7294

Table 1—Tabulation of loads applied to wings as shown in Figure 5

General Dimensions and Areas

Span, upper wing...26' 0"
Area, upper wing...99.5 sq. ft.
Chord, upper wing. 48"
Weight, per sq. ft..705 lbs. sq. ft. with ailerons
Span, lower wing..22' 0"
Area, lower wing..63 sq. ft.
Chord, lower wing. 42"
Weight, per sq. ft..715 lbs. sq. ft. with aileron cables
Stagger..... 12"
Mean gap..... 48"
Angle incidence....+1° with prop. axis
Weight, per sq. ft.. full load 6.56
Pounds, per H.P.... full load 11.85

The drag from the wings is taken by the lift wires, which are set forward at the fuselage for this purpose. Incidence wires are done away with in this design, being replaced by the rigid struts.

Procedure of Wing Test

The general formulat for deter-

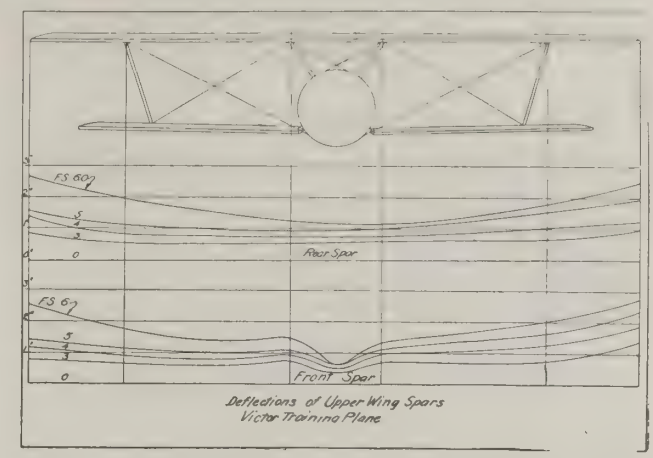


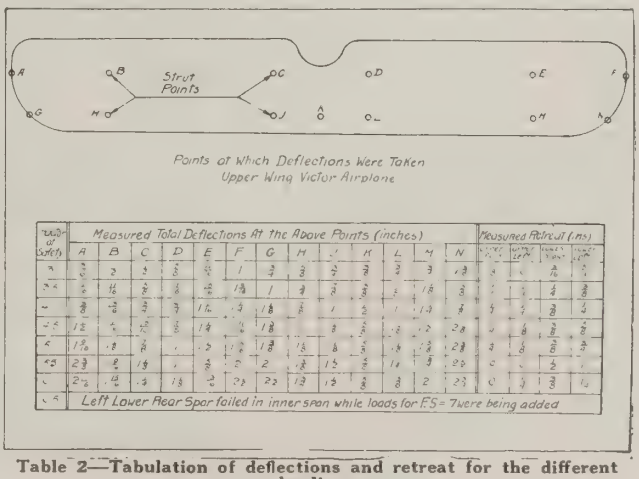
Figure 4—Deflection curves of wings during test shown in Figure 5

mining the send load to be applied to the wings is:

$$Wn = N\ (Wg - Ww) - Ww$$

where Wn = sand load to be applied
Wg = gross load
Ww = weight of wing truss complete
n = any factor of rapidity

If the machine is a Biplane, and the Gap/chord < 1 one sq. ft. of the lower wing is taken as equivalent to 8 sq. ft. of



Factor of Safety	Measured Total Deflections At the Above Points (inches) A	B	C	D	E	F	G	H	J	K	L	M	N	Measured Retreat (ins)
3	[illegible]													
3.5	[illegible]													
4	[illegible]													
4.5	[illegible]													
5	[illegible]													
5.5	[illegible]													
6	[illegible]													
6.5	[illegible]													
7	[illegible]													
7.5	[illegible]													
8	Left Lower Rear Spar failed in inner span while loads for F.S. = 7 were being added													

Table 2—Tabulation of deflections and retreat for the different loadings

the upper wing and, where the Gap/chord < 1 one sq. ft. of the lower wing is taken as equivalent to one sq. ft. of the upper wing, and the general formula for determining the load per sq. ft. of the upper and lower wing, respectively, when the Gap/chord < 1 is:

$$W = AuX + Al.\ 8X$$
$$W = Wg - Ww$$
Au = Area upper wings
Al. = Area lower wings
X = load per sq. ft. on upper wing
.8X = load per sq. ft. on lower wing



Direct side view of the Victor Advance Training Plane



Figure 6—General view after just failure in left lower rear wing spar at a factor of safety of 6.5+

The distribution of load along the span of the wings, both upper and lower, is taken as uniform when the variation of the chord is not great; although this condition does not actually exist in the air, the error is not large enough to appreciably affect the final results.

The wing chord is divided into three parts of one-third, one-sixth, and one-half, from front to rear, respectively, with $\frac{Wn}{2}$ on the front, $\frac{Wn}{4}$ on the middle, and $\frac{Wn}{4}$ on the rear part; no sand is put on the trailing edge, so that this method of loading gives the C. P. between 1/3 and ¼ of the chord from the leading edge. The machine is assembled in an inverted position, and trued up carefully after it is set up in the stand. It should be placed on an inclination so that the chord line of the wings makes an angle of 14° to the horizontal. This method imposes the necessary draft load on the wings that a machine would get when coming out of a dive suddenly, which is the worst condition that exists in flying. Figure 5 shows the machine set at the proper inclination, ready for the sand to be applied.

The wings attached to the fuselage were supported upside down on two timbers cut to the contour of the veneer fuselage, as shown in figure 5. Loads were added as per table 1, and vertical deflections and retreat at the wing tips observed for each loading. Table 2 gives a tabulation of all deflections

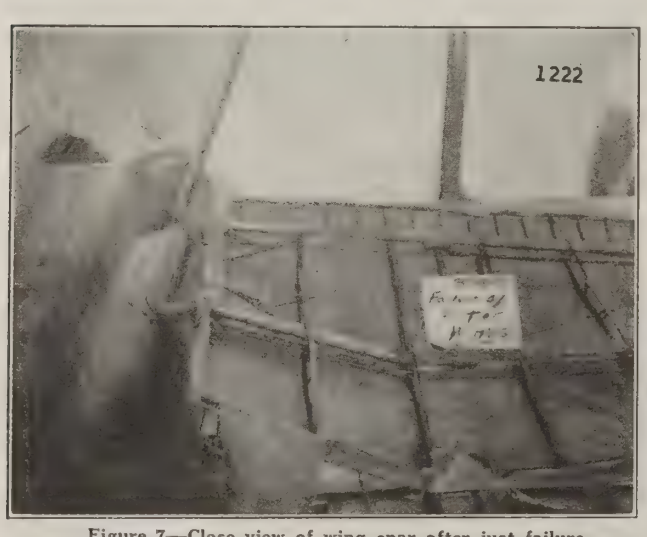


Figure 7—Close view of wing spar after just failure

and retreat for the different loadings, and figure 4 gives deflection curves.

The first failure occurred in the left lower rear spar, near the fuselage, as shown in photographs in figures 6 and 7, only the upper wing was supported by jacks while adding loads, the lower wing not being relieved of its load at any time. It is apparent from the front elevation in figure 1 that as only the flying wires are stressed during a sand test, no direct stresses can exist in the upper spars, but only beam action, which is not affected by jacks on the lower wing. In this case failure occurred while loads were being added slightly in excess of F. S. 6, 5. This test was continued on the other side until the lower rear spar broke at identically the same place as the left spar at a loading slightly over 8. No deflections were taken after the first failure, as they would not give a true indication of spar deflections. Slight buckling in the outer struts was observed at the higher loadings, but it did not assume alarming proportions at any time. Long before the first failure in the left wing, a sharp break was evident in the trailing edge at the place where the final failure occurred, this, undoubtedly, being caused by an accident that occurred to this wing when being set up, but at the time was not considered serious. It may have weakened this wing considerably.

This may be observed in the photograph figure 5, and is confirmed by the much greater strength of the right wing and the smoother deflection curve noticeable in this wing. The failure in the upper wing spar and strut head are not of much value as they were, probably, caused by eccentric loading due to the condition of the lower wing.

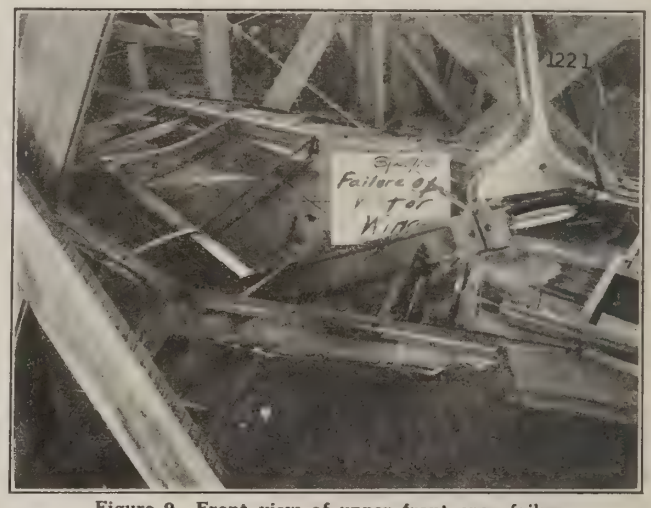


Figure 9—Front view of upper front spar failure

Conclusions

The Victor Plane was intended to have a factor of safety of 6.75, and taking into consideration the strength of the left wing, despite its weakened condition, and the much greater strength of the right wing, it may safely be concluded that the structure is strong enough and very satisfactory. The rather small retreat in the wings shows that the single struts are adequate in replacing the usual incidence wires in small machines of this type, but it is questionable whether this type of strut could be used on a much larger machine. The only drawback to this kind of construction is that it does not allow much freedom of adjustment of wings for stagger or incidence, but it, undoubtedly, does reduce the parasite resistance, and no fault can be found with the strength. Considering that the wings weigh less than .71 lb. per sq. ft. complete, the strength of the entire structure is very surprising, and a credit to the manufacturers.

(To be concluded)

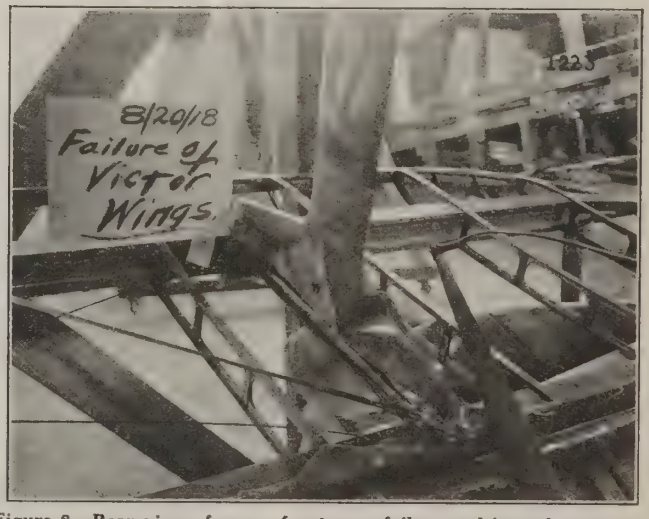


Figure 8—Rear view of upper front spar failure and interplane strut head at factor of safety of nine

SECOND PAN-AMERICAN AERONAUTIC CONVENTION AND EXHIBITION

To Be Held Under the Auspices of The Aero Club of America, The Aerial League of America and the Pan-American Aeronautic Federation.

From Thursday, May 1st, 1919,
to
June 1st, inclusive,
at
Atlantic City, N. J.

Intercollegiate Contests Throughout the Summer

CONTESTS TO BE HELD EACH SATURDAY

(1) Seaplane Contests (general),
(2) Curtiss Marine Flying Trophy and Prizes,
(3) Intercollegiate Seaplane Contests,
(4) Land Aeroplane Contests,
(5) Dirigible Contests,
(6) Kite Balloon Speed in Ascending and Descending, and Maneuvering Contests,
(7) Parachute Competition,
(8) Aviette (bicycles and motorcycles with wings) Contests.

EVERY DAY ACTIVITIES

(1) Exhibits of Aeroplanes, Motors and Accessories on the Steel Pier,
(2) Demonstrations and tests of Seaplanes, Land Aeroplanes, Motors, Dirigibles, Kite Balloons, to prospective purchasers and representatives of different governments,
(3) Aerial Passenger Carrying by seaplanes and dirigibles, and kite balloon ascensions,
(4) Moving pictures and Addresses by leading authorities on most important phases of aeronautics.

The Governments and Aeronautic, Sporting, Scientific, Industrial and Civic organizations of the United States and all the countries in the world, excepting Germany and her allies, are invited to send representatives to attend this great aeronautic event. On arrival in the United States these representatives should call at the Headquarters of the Convention Committee at No. 297 Madison Avenue, New York City, to register and receive their official badges and the official program.

In the event that it is more convenient for them to go directly to Atlantic City they will register at the offices of the Convention located at the following Atlantic City hotels: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis and Hotel Haddon Hall.

Representatives of the Convention Committee will be at the Bureaus of the Aeronautic Convention at the above-named hotels and will issue the official badges which admit the bearer to the Aeronautic Hall, as well as the Aero Exhibition on the Steel Pier, the judges' enclosure during contests, and to the Aerodrome and seaplane stations where the aircraft and motors will be demonstrated.

All communications until May 1st, should be addressed to Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

Entries for the competition should be addressed to the Chairman, Contest Committee, Aero Club of America, 297 Madison Avenue, New York City.



DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

THURSDAY, MAY 1ST

Opening of Convention and Exhibit.

AFTERNOON—Reception at Aeronautic Hall on the Steel Pier. Addresses by United States Government State and aeronautic authorities.

EVENING—Aero Show and addresses by officials.

FRIDAY, MAY 2ND

AFTERNOON—Aero Show. Preliminary tests of seaplanes, dirigibles and kite balloons.

EVENING—Moving pictures and address on flying for sport and pleasure.

SATURDAY, MAY 3RD

AFTERNOON—Seaplane and dirigible races, and kite balloon ascending and descending contest.

EVENING—Ball.

SUNDAY, MAY 4TH

MORNING—Memorial service by eminent Divine for the dead airmen.

AFTERNOON AND EVENING—Reception to allied aces and heroes of the air and their parents, and announcement of the award of the Aero Club of America Medal of Valor, and the Aerial League of America Diploma of Honor.

MONDAY, MAY 5TH

AFTERNOON—First parachute contest for $500 Bennett Prize.

EVENING—"The Large Dirigible and Its Value for Transportation." Representatives of railroads, express, steamship and other transportation organizations invited to attend.

TUESDAY, MAY 6TH

AFTERNOON—Illustrated addresses on "Aerial Forest Patrol." Forestry Department of every State invited.

EVENING—"Work of Aerial Police Squadrons, and Why Every City Should Have One."

WEDNESDAY, MAY 7TH

AFTERNOON AND EVENING—Aerial Mail Day. Illustrated address on, and consideration of, "Aerial Mail Planes." Chairman of Post Office and Post Roads Committees of House of Representatives and Senate, and Postmaster General Burleson invited to deliver addresses. (26,000 United States Postmasters, and Chambers of Commerce of 13,000 cities invited to attend.)

THURSDAY, MAY 8TH

AFTERNOON AND EVENING—Illustrated addresses on the "Need of Municipal Aerodromes, and the Part to be Played by Aircraft in City Planning." Chambers of Commerce and City Planning Commissions of 13,000 cities invited to attend.

FRIDAY, MAY 9TH

AFTERNOON—Arrival of seaplanes and army planes from Army and Navy Air Stations. Second parachute competition for the $500 Bennett Prize.

EVENING—Illustrated addresses on "Latest Developments in Aerial Warfare and Adventures in Aerial Warfare," told by famous aces.

SATURDAY, MAY 10TH

AFTERNOON—Army, Navy and Marine Corps Day. Aerial contests and tournament.

EVENING—United States Army and Navy Officers' Reception. Reception and addresses at Aeronautic Exhibition Hall on the Steel Pier.

SUNDAY, MAY 11TH

AFTERNOON AND EVENING—Presentation of the flags by each State of the United States to the Aero Squadrons representing the States. Each State will present a flag to each Aero Squadron, the members of which were overwhelmingly natives of that State. The presentation will be made by representatives from the State and the Aero Club and Aerial League branch of that State. All States and cities invited to send delegates, and Army, Navy and Marine Corps to send representatives.

MONDAY, MAY 12TH

AFTERNOON—Demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night." All national advertisers and advertising agents invited to attend.

EVENING—"Pan-American Aerial Transport Over Land." Addresses by members of the commissions of the 20 Latin-American Republics.

TUESDAY, MAY 13TH

AFTERNOON AND EVENING—"Pan-American Aerial Transport Over Water." Addresses by members of the 20 Latin-American Republics' Commissions.

WEDNESDAY AND THURSDAY, MAY 14TH AND 15TH

AFTERNOONS AND EVENINGS—"The Airways and Aerial Transport in Europe, Canada, Africa, Australia and Asia."

FRIDAY, MAY 16TH

AFTERNOON AND EVENING—"Aerial Navigation Instruments for Flying Over Land and Water." Aviators, navigators, scientific instrument makers and aeronautic experts invited.

SATURDAY, MAY 17TH

AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.

EVENING—Extensive exhibit of aerial photographs and photographic apparatus. All photographers, professional and amateur, and makers of photographic apparatus invited.

SUNDAY, MAY 18TH

AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH

AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."

EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH

AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST

AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.

EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22nd

AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Telegraphic and Climatic Factors in Relation to Aeronautics.

FRIDAY, MAY 23RD

AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulation of Air Traffic." (First day.) Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH

AFTERNOON—Races and contests.

EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH

AFTERNOON AND EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK.

MONDAY, MAY 26TH

AFTERNOON—"Aeronautic Engineering Problems and Their Prospective Solution."

EVENING—Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH

AFTERNOON—"Factors That Increase the Efficiency for Large Dirigibles."

EVENING—"Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH

AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."

EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH

AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."

EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)

AFTERNOON—Dirigible races, kite balloon speed ascending contest; parachute contest.

EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST

AFTERNOON—Seaplanes, land planes and dirigible contests. Aviette competition at which all cyclists and makers of bicycles and motorcycles will be invited.

EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST

AFTERNOON AND EVENING—Award of prizes and diplomas for all events.


Beardmore
THE BEST AERO ENGINE
UNDER THE SUN.
Beardmore Records prove this to the hilt.
THE BEARDMORE AERO ENGINE, LIMITED,
London Showrooms and Depot—112, Great Portland Street, London, W. 1.
Telephone: 238 Gerrard.
C.D.G.

THE THOMAS-MORSE TYPE S-6 TWO-SEATER

TO provide a slow landing machine of the two-seater type for training purposes or civilian use, the type S-6 Tandem Two-Seater has been brought out by the Thomas-Morse Aircraft Corporation.

The Tandem Two-Seater follows along the lines of the S-4 C Scout with such modifications as are necessary to carry the passenger. The wing area has been increased to take care of the added weight and minor changes made with a view to reducing the gross weight without, however, infringing upon the safety factor which a machine of this type requires.

Dual stick type control is installed with flexible conections in the passenger's cockpit, so that the pilot may maintain control at all times. Good performances are observed in this machine. Its high speed is 105 M. P. H., landing speed 38 M. P. H., and it has the ability to climb to an altitude of 8,000 feet in the first ten minutes. The general specifications of the Type S-6 Tandem Two-Seater are as follows:



Side view of the Thomas-Morse Type S-6 Tandem two-seater

General Dimensions

Length	20′ 8″
Spread	29′ 0″
Height	8′ 10″

Weights

Total weight (loaded)	1,385 lbs.
Area lifting surface (including ailerons)	296 sq.ft.
Loading per sq.ft. of lifting surface	4.68 lbs.
Required horse power	90
Weight of machine (loaded) per h.p.	15.4 lbs.

Power Plant

Type of engine	80 h.p. Le Rhone (air cooled rotary)
Engine revolutions per minute	1,250
Fuel capacity	20 gallons
Fuel duration at full power	2½ hours
Oil capacity	4 gallons
Oil duration at full power	3 hours
Propeller type	2 blade
Propeller diameter	7′ 10″
Propeller revolutions per minute	1,250

Chassis

Type	"Vee"
Wheels	2 (tread 5 ft.)
Tires	26″ x 3″

Areas of Control Surfaces—(*Square Feet*)

Ailerons (four)	31.5
Elevators	16.8
Rudder	8.5
Horizontal stabilizer	14.5
Vertical stabilizer	3.5

Stick type control used.

Performance

High speed	105 M. P. H.
Low speed	40 M. P. H.
Climb in first ten minutes	8,000 feet

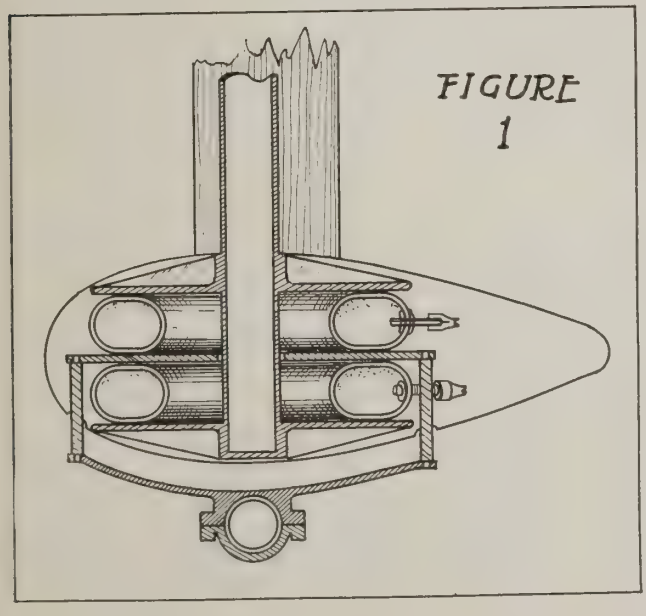
A NEW PRINCIPLE IN SHOCK ABSORPTION

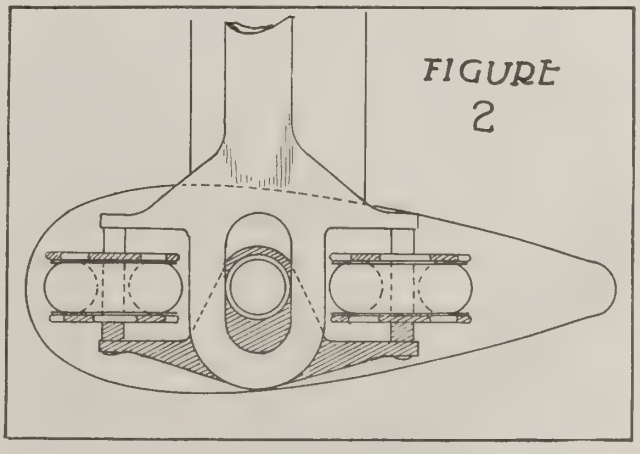
IT is well known that the most difficult part of flying is the "taking off" and in landing, for in these manoeuvers damaging strains are put upon the landing gear and distributed throughout the machine. Means for absorbing these shocks have led to many forms of landing gear designs and at the present time the problem seems to have resolved itself into devising the best manner of employing rubber shock absorber cord.

A point which has yet to be covered in the design of landing chassis is the elimination of rebound when the machine strikes the ground, and it is in this direction that designers must turn their attention before great progress can be looked for and before a solution can be found for overcoming difficulties in landing.

Experiments and research have been carried on by Colonel William N. Amory, the inventor of an air cushion shock absorber which has proven its value as far back as 1899, when he experimented with a pneumatic shock absorber for bi-

(*Continued on page* 175)





ATMOSPHERIC CONDITIONS AFFECTING POWER

By A. JOHNSON

IN estimating for aeronautical purposes the probable power and consumption of an engine at elevations above sea level, it is necessary to possess a table showing the density, pressure, and temperature of the atmosphere at different heights. It is the purpose of this article to give such a table, and to collect in a convenient form the mathematical reasoning on which it is based.

The atmosphere may be considered as a mass of elementary gas expanding in opposition to the action of gravity according to the adiabatic law so that pv^y is constant. If the expansion were truly adiabatic—that is, if the gas received no heat during expansion—the numerical value of y would be 1.4, and the temperature of the atmosphere would diminish with height at the rate of 3° Centigrade for each thousand feet. But the atmosphere does receive heat during expansion, directly from the sun and indirectly by radiation from the earth, and it has been found by observation that its temperature diminishes with height almost exactly at the rate of 3° Fahrenheit for each thousand feet. The value of y which would yield an exactly corresponding result is $y = 1.18985$, but it is near enough, and much more convenient for arithmetical calculation to put $y = 1.19$, and to assume that within the limits with which we are practically concerned the atmosphere expands so that $pv^{1.19}$=constant and $Tv^{.19}$= constant. It behaves, in fact, precisely as if it were a gas of higher specific heat expanding adiabatically.

Considering, then, a quantity of air weighing 1 lb., the following assumptions are made:

p_o = Pressure at sea level.
= 2116.8 lb. per sq. ft.
= 14.7 lb. per sq. in.
= 29.9 in. barometer.
T_o = Temperature at sea level.
= 60° Fahr. = 521° abs.
V_o = Volume at sea level.
= 13.09045 cu. ft.
W_o = Weight per cu. ft. at sea level.
= .07639 lb.

Then, by hypothesis:

$$Pv^{1.19} = C$$

$$v^{1.19} = \frac{C}{p}$$

$$V = C\frac{1}{1.19}p - \frac{1}{1.19}$$

$$\text{and } W = \frac{1}{v} = C - \frac{1}{1.19}p\frac{1}{1.19}$$

and, writing c for $C - \frac{1}{1.19}$,

$$W = cp\frac{1}{1.19} \quad \dots \quad \dots \quad \dots \quad (1)$$

This is a general statement, and since in the particular case $W_o = cp_o\frac{1}{1.19}$ the values of W_o and p_o are known, the value of c can be calculated. When p is expressed in lb. per sq. ft. log. $c = 4.08836$.

Fig. 1 represents a column of air one square foot in area. When h is height in feet, the weight of a thin slice of thickness ($ab = dh$) constitutes the difference of pressure in lb. per square foot between the heights at a and b. Since the pressure is less when h is greater, this difference dp is negative, and therefore

$$-dp = w.dh$$

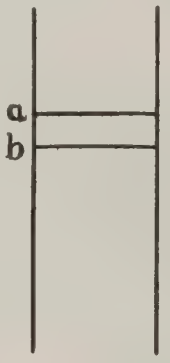


FIGURE 1

Substituting the value of W from Equation (1),

$$-dp = cp\frac{1}{1.19}dh$$

$$\therefore -p - \frac{1}{1.19} = c\frac{dh}{dp}$$

and, aggregating,

$$-\frac{1.19}{.19}p^{\frac{.19}{1.19}} = c.h + \text{const.}$$

$$\therefore p^{\frac{.19}{1.19}} = \text{const.} - \frac{.19}{1.19}ch$$

When h is O the term involving h vanishes, also when h is O, $p^{\frac{.19}{1.19}} = p_o^{\frac{.19}{1.19}}$; therefore

$$p^{\frac{.19}{1.19}} = p_o^{\frac{.19}{1.19}} - \frac{.19}{1.19}ch \quad \dots \quad (2)$$

Equation (2) gives the pressure at any height, and therefore the atmospheric density at the same height can be calculated from Equation (1). Both of these equations assume that the temperature falls in accordance with the adiabatic law, and the extent of the fall of temperature is found as follows, using the general index y:

$pv = RT$, where R is constant.

$$\therefore \frac{pv}{T} = R = \frac{2116.8 \times 13.09045}{521} = 53.186$$

It has been shown that $V = \frac{p^{-\frac{1}{y}}}{c}$

$$\therefore pv = RT = \frac{p^{1-\frac{1}{y}}}{c}$$

$$\therefore T = \frac{p^{1-\frac{1}{y}}}{cR} \text{ and } T_o = \frac{p_o^{1-\frac{1}{y}}}{cR}$$

Substituting from Equation (2) the value of $p^{1-\frac{1}{y}}$

$$T = \frac{p_o^{1-\frac{1}{y}} - \left(\frac{y-1}{y}\right)ch}{cR}$$

$$\therefore T = T_o - \left(\frac{1}{R}\frac{y-1}{y}h\right) \dots . (3)$$

The fall of temperature is therefore a constant multiple of h, and, if in Equation (3) $h = 1000$ and $y = 1.19$, it will be found on making the numerical calculation that $T_o = T = 3.002$ (deg. Fahr.), thus indicating that the value of y has been selected with sufficient accuracy. The table which follows has therefore been calculated from Equations (1) and (2) on the assumption that $y = 1.19$.

These determinations are intended as a conventional standard for the estimation of engine results likely to be obtained at different heights under what are assumed to be normal conditions. They will be found to agree closely with the figures yielded by current formulæ for the determination of elevations from observation of barometric pressures and temperatures at two stations.

Byt the use of the laws known to govern the expansion of gas within an enclosed space, such as a cylinder with a moving piston, it is, then, possible to determine the density and pressure of the atmosphere at various heights above the general surface of the earth with results which are in practically exact agreement with those of standard formulæ designed for the calculation of difference of elevation from observed differences of pressure

Height above Sea Level. Feet.	*Density per Cent.*	Pressure. *lb. per sq. ft.*	Pressure. *lb. per sq. in.*	*Barometer. Inches.*	*Temperature, Degrees Fahrenheit.*
0	100,000	2116.80	14.700	29.900	60
2,000	94.082	1968.57	13.671	27.806	54
4,000	88.451	1829.17	12.703	25.837	48
6,000	83.096	1698.15	11.793	23.987	42
8,000	78.007	1575.12	10.964	22.249	36
10,000	73.173	1459.66	10.137	20.618	30
12,000	68.584	1351.40	9.385	19.089	24
14,000	64.232	1249.98	8.680	17.656	18
16,000	60.106	1155.02	8.021	16.315	12
18,000	56.197	1066.20	7.404	14.717	6
20,000	52.497	983.19	6.828	13.888	0
22,000	48.997	905.69	6.290	12.793	—6
24,000	45.688	833.38	5.787	11.772	—12
26,000	42.562	765.98	5.319	10.820	—18
28,000	39.613	703.24	4.884	9.933	—24
30,000	36.830	644.87	4.478	9.109	—30

and temperature. Difference of atmospheric conditions appropriate to different elevations affect the power, speed and consumption of an engine in ways which, without giving information to the enemy, may be considered in a purely elementary manner, omitting all reference to the method of supporting the engine (as in an aeroplane), which has its own influence on the results, and to such details as carburetion and ignition, which from a practical point of view are essential factors.

It will be assumed then (*a*) that the engine is simply supported in the atmosphere on an even keel and clear of obstructions, (*b*) that its work consists of driving a propeller, (*c*) that it is supplied with a mixture of a constant proportion by weight of air to petrol, and (*d*) that the barometer at sea level stands at 29.9 inches and that the temperature there is 60° Fahr. or 521° absolute. Since further approximations are used, it cannot be expected that the concluding table exhibits with complete accuracy even the results to be expected on these assumptions. Fractions are merely the arithmetical results of calculations from the assumed data and have no further significance.

If ABCD (Fig. 2) is an indicator diagram, the pressure at A will be p, the atmospheric pressure in lb. abs. per square

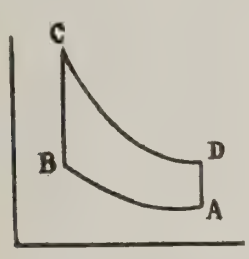


FIGURE 2

inch, and if n be the compression ratio the pressure at B will be pn^v.

With a constant mixture the pressure at C will be Mpn^v where M is a constant, and, since the mean pressure is proportional to the difference between the pressures at B and C, it is proportional to $p(M-1)$, since n^v is constant.

The temperature at A is t, the temperature of the charge at the end of the induction stroke; then the temperature at B will be tn^{v-1}, and, if N be the constant amount by which the charge is capable of raising its own temperature on firing, the temperature at C will be $N + tn^{v-1}$, which is $\frac{N + tn^{v-1}}{tn^{v-1}}$ or $\left(\frac{N}{tn^{v-1}} + 1\right)$ times the temperature at B, and therefore

$$M = \left(\frac{N}{tn^{v-1}} + 1\right) \text{ or } (M-1) = \frac{N}{tn^{v-1}}$$

and $(M-1)$ is proportional to $\frac{1}{t}$, and the mean pressure is proportional to $\frac{p}{t}$. Consequently horse-power is proportional to

$$\frac{p}{t} \text{ (r.p.m.)}.$$

This result is supported by experimental results obtained at ground level, but a difficulty arises in expressing by a simple formula the value of t so that calculations of the horse-power corresponding to higher elevations may be made. Since the charge is introduced into a hot cylinder containing part of the higher than the atmospheric temperature T, and since for equal volumes the specific heat of the denser gas will be higher, it may be assumed that the amount by which the temperature of the entering charge is raised will be inversely proportional to its density. The author considers, therefore, that it is sufficiently accurate to put:

H.P. = horsepower-constant

$$\times \text{ (r.p.m.)} \times \left(\frac{p}{T + \frac{100}{D}}\right) \quad (1)$$

where p is the atmospheric pressure, T is the absolute temperature of the atmosphere in degrees Fahr., and D is the density of the atmosphere expressed as a fraction, density at sea level being unity.

When an engine does work driving a propeller, the power is very nearly proportional to the cube of revolutions and to the density of the medium in which the propeller revolves, and so we may put:

H.P. = constant $\times$ (r.p.m.)$^3 \times$ D ... (2)

Equating the right-hand members of (1) and (2):

$$\text{Constant} \times \text{(r.p.m.)}^3 \times D = \text{(r.p.m.)} \times \left(\frac{p}{T + D\frac{100}{D}}\right)$$

$$\text{Constant} \times \text{(r.p.m.)}^2 = \frac{p}{DT + 100}$$

$$\text{(r.p.m.)} = \text{constant} \times \sqrt{\frac{p}{DT + 100}} \quad .. \quad (3)$$

Height above Sea Level. Feet.	*R.P.M. per Cent.*	*Horse-power per Cent.*
0	100.00	100.00
2,000	99.40	92.40
4,000	98.76	85.19
6,000	98.07	78.38
8,000	97.34	71.95
10,000	96.56	65.88
12,000	95.73	60.16
14,000	94.84	54.80
Height above Sea Level. Feet.	*R.P.M. per Cent.*	*Horse-power per Cent.*
16,000	93.90	49.77
18,000	92.90	45.05
20,000	91.83	40.66
22,000	90.71	36.57
24,000	89.51	32.77
26,000	88.25	29.25
28,000	86.91	26.01
30,000	85.51	23.03

The engine speed may therefore be calculated from (3) and the horse-power from (1) or (2), using the values of p, T, and D tabulated in the previous article and the constant which fits the sea level figures. The results for elevations up to 30,000 feet are stated in the above table.

If the truth of Equation (1) be assumed, the consumption per horse-power should be the same at all heights, for the consumption should be proportional to:

$$D \times \text{(r.p.m.)} \times \frac{T}{T + \frac{100}{D}}$$

and since $\text{H.P.} = \left(\frac{p}{T + \frac{100}{D}}\right) \text{(r.p.m.)}$

$$\frac{T}{T + \frac{100}{D}} = \frac{\text{h.p.} \times T}{p \times \text{(r.p.m.)}}$$

and consumption is therefore proportional to

$$D \times \text{(r.p.m.)} \times \frac{\text{h.p.} \times T}{p \times \text{(r.p.m.)}} = \text{h.p.} \times \frac{DT}{p}$$

but $\frac{DT}{p} = \frac{T}{pv} = \text{constant}.$

Therefore consumption is directly proportional to horse-power.

But the increase of temperature of the entering charge is due to two causes: First, the temperature gained by contact with heated metal which *does* affect the weight of the charge, and, secondly, the temperature gained by mixture with the products of previous combustion which *does not* affect the weight of the charge. This latter statement may appear self-evident to some readers, but will not to others. It may be proved shortly as follows, assuming that the two increases of temperature take place separately.

In Fig. 3 (*a*) v is the total cylinder volume and the compression space, unity. is filled with products of combustion at temperature M. On the induction stroke a

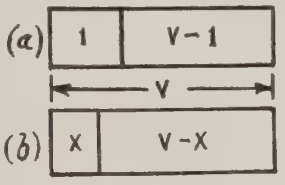


FIGURE 3

voluume of charge heated to temperature T by contact with the cylinder is mixed with the products of combustion, so that the temperature of the whole becomes N, which is less than M and more than T. If then the products of combustion and the charge were separated as in (*b*) they would occupy the volumes x and $(v-x)$, which also represent their relative weights, and therefore

$$N = \frac{xM + (v-x)T}{v}$$

But $\frac{x}{1} = \frac{N}{M}$

therefore $N = \frac{N + (v-x)T}{v}$

and $N(v-1) = T(v-x)$

and $(v-x) = (v-1)\frac{N}{T}$

which proves the proposition, and the charge is, therefore, always of $(v-1)$ volumes at temperature T.

It is not found, however, that the introduction of this complication into the calculation reveals any material departure from the simple relation stated that with a mixture of constant proportion by weight the consumption per horse-power remains constant at all heights.

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Olcott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in the order named.
Note 2—Report to Little Building, to district manager aircraft finance, Boston, Mass.
Note 3—Report to the Adjutant General, Washington, D. C.
Note 4—Report to Sixth Aero Squadron, Honolulu, Hawaii.
Note 5—Report to 360 Madison Avenue, New York City, to district manager aircraft finance.
Note 6—Report to Bolling Field, Washington, D. C., for duty.
Note 7—Report to Camp Lee, Va.
Note 8—Report to Fort Wayne, Mich.
Note 9—Report to Commanding Officer, Acceptance Park, Dayton, Ohio, for duty and by letter to D. M. A.—Washington.
Note 10—Report to 271st Aero Squadron, Aberdeen Proving Grounds, Aberdeen, Md.
Note 11—Report to 1550 Woodward Avenue, Detroit, Mich.
Note 12—Report to Army Balloon School, Lee Hall, Va.
Note 13—Report to Keenan Building, Pittsburgh, Pa., to district manager aircraft finance.
Note 14—Report to Army General Hospital No. 6, McPherson, Ga.
Note 15—Report to U. S. Army General Hospital No. 28, Fort Sheridan, Ill.
Note 16—Report to U. S. Army General Hospital Walter Reed, Takoma Park, D. C.
Note 17—Report to U. S. Army Balloon School, Fort Omaha, Neb.
Note 18—Report to Army Balloon and Airship Detachment, Akron, Ohio.

Special Orders Nos. 56 to 60, Inclusive

A
Arnold, Henry H.....RSD

B
Brown, Orle W.....Note 2
Barthen, Theodore.....Note 5
Brooks, M. P.....FRF
Bohm, Arno Edward.....Note 9

D
Duncan, Floyd R.....FRF
Disher, Harry P.....BFT

E
Eliason, Carl G.....Note 10

F
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G
Griffith, Ralph E.....Note 14
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H
Healy, James A.....DMA
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K
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L
Lebrou, Richard K.....AGC
Lewis, Wm. E.....Note 4
Lawrence, George W.....Note 11
Lewis, Burton F.....Note 10
Lee, Robert E.....Note 13
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M
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Murtha, John T.....AGC
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P
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Putnam, Chas. F.....Note 12
Pratt, Henry C.....DAP
Page, Edwin R.....DAP

R
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S
Simonin, Arthur E.....DAP
Slaughter, Edgar H.....Note 16
Saunders, Wm. H.....DAP
Smith, De Witt C.....Note 7
Shively, James C.....Note 10

T
Taylor, LeWallace W.....Note 18

W
Walsh, Eugene.....AGC

Total Casualties in Aero Service Abroad Were 554

Washington, March 21.—Casualties in the United States Air Service personnel, serving with the American and Allied armies at the front, numbered 554. Of the total, 171 men were killed in combat.

A table made public by the War Department gives the following official casualty report for the air service at the front:

Killed in combat, 171; prisoners, 135; wounded, 129; missing, 73; killed in accidents, 42; other causes, 4.

The record by months shows the rapid rise in casualties as American fliers began to get into action. It follows:

March, 1918, 2; April, none; May, 27; June, 29; July, 65; August, 82; September, 181; October, 125; November to November 11, 43.

War Department Policy on Retirement of Officers Explained by Order

Washington, D. C.—The War Department recently made public a general order outlining the policy followed in the retirement of officers, as follows:

Circular No. 69.

War Department,
Washington, February 8, 1919.

Assignment and Demotion of Officers

1. During the period of the emergency, officers who are assigned to line duties will be assigned according to their temporary grades as prescribed in the Tables of Organization. In making assignments to staff or other duties, not line, below the grade of brigadier general, officers will be assigned without regard to the grades authorized by the Tables of Organization. General officers will be assigned to duties consistent with their grades, and when they cannot be so assigned orders will be issued by the War Department demoting them to their Regular Army rank.

2. When officers of the Regular Army become surplus in their emergency grades their names will be reported to the War Department. If vacancies exist to which they can be assigned in their emergency grades their names will be reported to the War Department. If vacancies exist to which they can be assigned in their emergency grades they will be so assigned. If no such vacancies exist they will be demoted to their Regular Army rank.

3. Class 1 and 2 emergency officers (Circular No. 75, W. D., 1918) who become surplus will be discharged as prescribed in previous instructions. Class 3 officers will be available for assignment to existing vacancies, or for assignment to Central Training Schools without reduction in rank. Class 3 officers who are not recommended for appointment in the Regular Army during or after attendance at such schools will be discharged when their services are no longer needed.

4. It is the policy of the War Department to return to the inactive list retired officers, now on active duty, who can be replaced by officers on the active list. Chiefs of bureaus and arms of the service and commanding officers who have retired officers on duty under them will submit on February 15, 1919, list of such officers. They will indicate which of these retired officers they consider should be retained on active duty for the best interests of the service. Recommendations for retention of retired officers on active duty must be accompanied by reasons. Retired officers holding emergency advanced rank will be demoted to their Regular Army rank upon being returned to the inactive list.

5. In addition to the normal demotions under paragraph 2 of this circular, officers of the Regular Army who have been found unsuited for their advanced rank and who have not already been demoted, and officers who may hereafter be found unsuited for their advanced rank, will be demoted to their Regular Army rank. Commanding officers and chiefs of staff corps and departments will submit without delay, and from time to time in the future, recommendations for the demotion of such officers. These recommendations will be carefully reviewed by the War Department in connection with the complete records of the officers concerned.

By order of the Secretary of War:

PEYTON C. MARCH,
General, Chief of Staff.

Official:
P. C. HARRIS,
The Adjutant General.

Air Service to Follow Overseas Organization Plan

Washington, D. C.—The War Department authorizes the following statement from the Director of the Air Service:

In connection with the recent announcement regarding the organization of the Army Air Service, Major General Charles T. Menoher pointed out that the system of the staff organization used overseas had been followed.

The Director of the Air Service, assisted by an executive officer who is his official mouthpiece and is authorized to sign his name and in general act as his executive in every sense of the word. The Director's Executive Staff is composed of four officers, one at the head of each division; namely, Supply, Information, Training and Operations, and Administrative. These four officers are not placed in any order of rank nor do they report to each other. They are all responsible to the Director of the Air Service and operate their own divisions.

The first assistant executive has charge of supply, aeroplane engineering, production, procurement, maintenance and finance disbursement for the entire air service in both aircraft production and military aeronautics.

The second assistant executive gathers and distributes all information and in war time would have charge of intelligence work for the whole air service.

The third assistant executive directs training and operations and is at the same time Director of Military Aeronautics. This is the office held at present by Brig. Gen. William Mitchell, who assisted General Menoher in working out the new system.

The fourth assistant executive is practically the Adjutant General of the Air Service, controlling administration and executive work, personnel, office management, cables and correspondence, etc.

Lieut. Col. Wm. C. Sherman, Corps of Engineers, who is a flier and who has been connected with the Air Service for some years, has been detailed as Chief of Air Service Training, which will include heavier-than-air training at the ground schools and flying fields under General Mitchell.

Air Service Division of Surgeon General's Office Discontinued

Washington, D. C.—The War Department authorizes the following statement from the Office of the Surgeon General:

The Air Service Division of the Office of the Surgeon General, created during the war to handle medical problems connected with the aviation service, has been discontinued, effective at once. Business heretofore transacted by this division has been taken over by the Air Service, under the jurisdiction of its chief surgeon.

War Department Announces the Fields It Will Purchase

Washington.—A decision by the War Department to proceed with the purchase of the sites of fifteen army camps and thirteen balloon and flying fields was announced by Acting Secretary Crowell. Less than $15,000,000 would be involved, Mr. Crowell said, and it would not be necessary to await action by Congress, as the department had the necessary funds.

With these purchases completed, the army will have thirty training camps, including the sixteen original cantonments constructed for the training of the National Army, and nineteen aviation centers, most of which will be in the Southeastern States, Texas, and California. The few fields to be retained in the North will be regarded as summer flying centers only.

Twenty-seven camps and fifteen aviation fields will be abandoned. Orders have gone out for the abandonment of twenty of the camps, including nearly all of the National Guard training centers set up after the United States declared war on Germany.

Construction work on the twenty-seven camps, according to War Department figures, represents a cost of approximately $110,000,000, of which $43,000,000 was spent on the four embarkation cantonments—Mills, New York, Merritt, New Jersey, and Stuart and Hill, Newport News, Va.

Approximately $280,000,000 has been spent in construction work on the fifteen cantonments to be bought and the fifteen now owned. It was largely because of the sum involved that the Department decided to go ahead with the purchase.

Most of the thirty camps are now being used as demobilization centers, but no definite plans for their employment after the war army is disbanded have been evolved. It was explained that the whole problem of the future use of the camps depended upon the nation's military policy and that no conclusion as to that could be reached until the Peace Conference at Paris had rendered its decision on world disarmament.

Announcement has already been made that only two flying fields will be actually used in training army aviators in peace time and that others purchased or now owned would become storage plants for material on hand or under contract. Location of the flying centers to be retained shows a plan to have three general training centers, one in the Far West, one in the southwestern part of the country and one in the Southeast, with the different fields in each section close enough together so that elementary and advanced training will be provided within a reasonable area. Total expenditures on the nineteen flying and balloon fields to be retained represent about $30,000,000.

Besides the fields to be bought for military purposes, one other, Chapman Field, Florida, will also be purchased "for business reasons" and subsequently sold. The same procedure will be followed in the case of Camp Sevier, South Carolina, which was used as a National Guard training center. Mr. Crowell said it was cheaper for the Government to buy this field at the option price of $597,940 and sell it again than to pay the damage claim made against the Government as the result of the building of the camp.

Secretary Crowell also said that the department had contemplated retaining Hazelhurst Field, on Long Island, but that the land would cost entirely too much. The option price on the field was placed at $1,550,000, or nearly twice the cost of the site of any of the thirteen aviation centers to be purchased. The Government has spent $5,348,898 on construction work at this field, considerable more than has gone into any other plant except Langley Field, Virginia, which is to be retained, and Wilbur Wright Field, Ohio, which is to be abandoned.

Decision on Aviation Fields

Flying and balloon fields, the sites of which are owned by the Government and which are to be retained and the cost of construction on each, are:

Langley Field, Virginia, $6,782,109.
Post Field, Oklahoma, $2,263,000.
Kelly Field No. 1, Texas, $1,928,000.
Rockwell Field, California, $832,000.
Lee Hall, Virginia, $818,150.
Fort Omaha and Fort Crook, Nebraska, $597,663.

Flying and balloon fields under option and to be purchased for military purposes, and the cost of construction on each, together with the price at which the land will be bought, are:

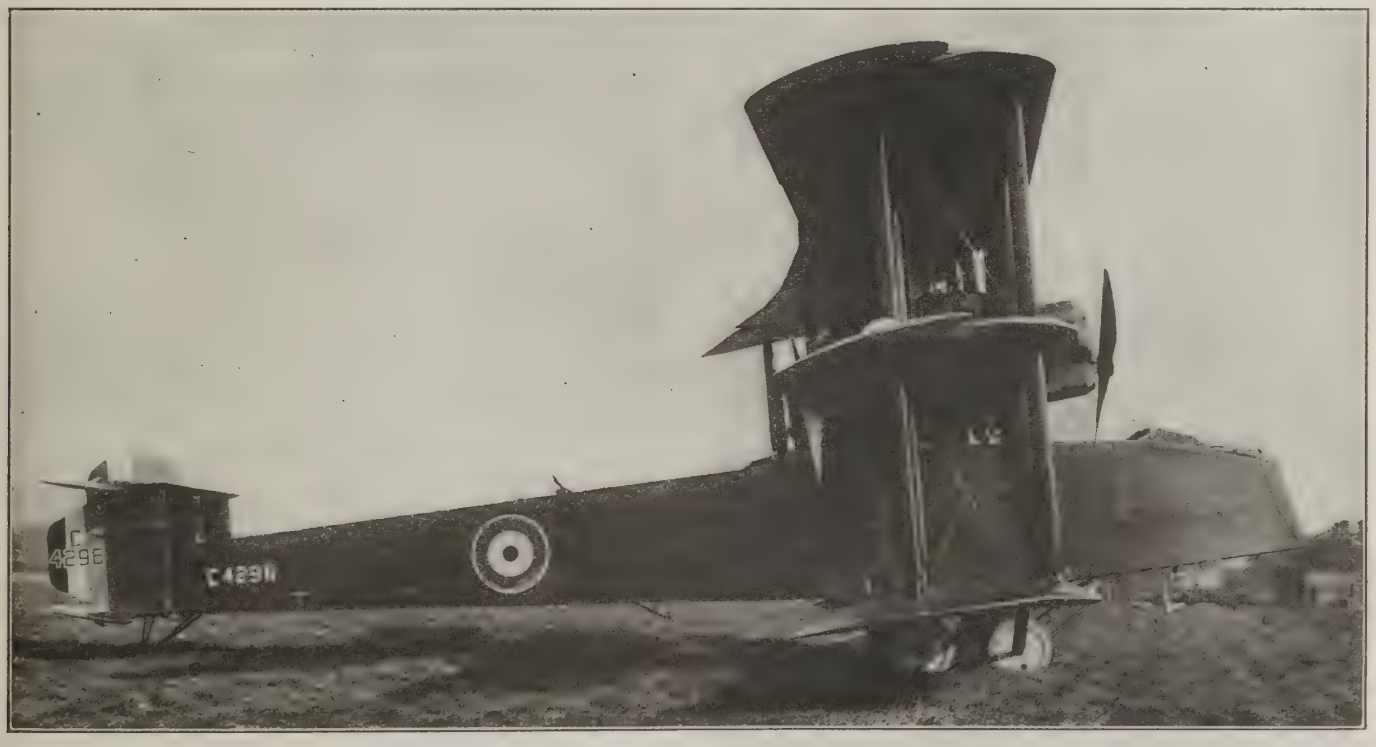
Arcadia Balloon School, California.
Brooks Field, Texas, $1,358,000—$170,273.
Dorr Field, Florida, $1,411,737—$5,120.
Carlstrom Field, Florida, $1,199,237—$5,120.
Scott Field, Illinois, $1,737,576—$122,892.
Chanute Field, Illinois, $1,168,022—$208,700.
Ellington Field, Texas, $2,328,991—$102,400.
Kelly Field No. 2, Texas, $2,599,686—$343,686.
March Field, California, $894,071—$64,000.
Mather Field, California, $750,062—$78,653.
Selfridge Field, Michigan, $2,455,426—$100,000.
Park Field, Tennessee, $2,097,079—$88,010.
Souther Field, Georgia, $1,220,497—$32,534.

Fields to be abandoned, with the cost of each, are:

John Wise Field, Texas, $268,266.
McCook Field, Ohio, $799,753.

Fields the sites of which are leased and which are to be retained for temporary storage purposes, and thereafter to be abandoned, follow, with the cost of construction on each:

Barron Field, Texas, $1,264,880.
Call Field, Texas, $1,172,209.
Carruthers Field, Texas, $1,114,311.
Eberts Field, Arkansas, $1,815,840.
Hazlehurst Field, New York, $5,348,878.
Love Field, Texas.
Payne Field, Mississippi, $1,373,815.
Rich Field, Texas, $1,112,385.
Taliaferro Field, Texas, $1,368,416.
Taylor Field, Alabama, $1,274,927.
Wilbur Wright Field, Ohio, $6,224,407.
Gerstner Field, Louisiana.



The Bristol Bomber Triplane Type "Braemar" with 4 Puma engines

FOREIGN NEWS

U. S. to Receive Zeppelins

Paris.—Definite information has reached Washington that Germany will be required to surrender part of her large fleet of Zeppelins, said to number more than fifty. Great Britain is understood to have demanded this action. The United States is expected to receive one or more of the German "Zeps."

London-Paris Record Again Broken

Paris.—Major General John E. B. Seeley of the British War Office on March 16 flew from Folkestone to Paris, a distance of 172 miles, in 74 minutes, establishing a new record for the flight. The aeroplane had the wind behind it.

Bolsheviki to Use Planes for Anti-Allied Propaganda

The Russian Bolshevik government is planning to use aircraft in a propaganda campaign in England and France, according to Swedish press reports made public by the State Department. Aviators for the work are said to be in training at Moscow.

The scheme is to drop papers containing Bolshevik propaganda written in invisible ink.

Michelins Warn of Danger of German Commercial Air Fleets

Paris.—Andre and Edouard Michelin, discussing in *La Liberte* the aerial clauses of the peace treaty, establish a good case, if not for the total suppression of commercial aviation in Germany, at any rate its strict limitations. It is known that aerial clauses in the peace treaty forbid Germany to have any military aviation at all.

The Michelins, who have played a great part in the development of French aviation in the war, declare that there is oniy one difference between a bombardment plane and commercial machine; that is, that the commercial plane has no bomb-throwing machinery.

At the present moment a bomb discharger can be fitted within an hour upon any civilian aeroplane, thus militarizing it. They draw a picture whereby Germany in one night by mobilizing all her civilian aeroplanes and fitting them with dischargers and bombs could send an enormous fleet over Brussels, London and Paris and over the arsenals and mobilization centers.

Commission on Aeronautics Appointed by Supreme Council of Peace Conference

Paris.—The Supreme Council appointed a Commission on Aeronautics on March 17. The American members of the commission will be Rear Admiral Harry S. Knapp and Brig.-Gen. Mason M. Patrick. The council named Belgium, Greece, Portugal, Brazil, Cuba and Rumania to repreesnt the small nations.

King Albert Visit to Pershing by Aeroplane

Chaumont, France.—King Albert and Queen Elizabeth of Belgium are planning a flight from Brussels to Chaumont to pay a visit of several days to General Pershing.



A temporary observation station equipped with sound magnifying amplifiers, which detect enemy planes at a distance of several miles

Two Giant Dirigibles Ordered by England

London.—Following successful trials of new British dirigibles of the rigid type of construction, the Government, according to the *Mail*, has ordered the building of two enormous airships. Each will be 800 feet long, with a capacity of 3,000,000 cubic feet. They will be driven by six engines, which will generate a total of 1,800 horsepower, and, it is said, will have a lifting power of 80 tons, compared with 29 tons, the largest load carried by any known to be in existence.

German Air Raid Damage Over $5,000,000

Basle.—According to official Berlin statistics, the damage done in Germany by air raids during the war period amounted to 23,500,000 marks ($5,875,000).

German Six-Motored Biplane for Transatlantic Trip

The Hague.—At Doberitz a new large Siemens-Schuckert biplane is now undergoing trials ostensibly with the view of ultimately making a bid for the transatlantic record. The machine as designed would, it is estimated, accomplish the flight from Hamburg to New York in twenty hours.

Tanks with about 750 gallons capacity are fitted upon the aeroplane, and it is believed that the total fuel required, amounting to about three times this figure, could be carried by the machine, which has six engines with a total of 1,800 horsepower, driving four propellers.

Ambassador Davis Flies to Coblenz

Coblenz, March 15.—Ambassador John W. Davis and a company of prominent Britons, including Lords Peel and Burnham, respectively Under Secretary for War and owner of the London *Daily Telegraph;* Lieut. Gen. Godley and two each of British major generals, brigadier generals and captains, arrived at Coblenz by aeroplane for a visit to the American Army of Occupation.

Vickers, Ltd., R-80 Dirigible Tested

London.—Another giant dirigible capable of crossing the Atlantic received its first trial on March 20. Her hull is the most careful streamline yet used on a dirigible and the craft is equipped with three bow mooring attachments, which enable her to be moored out from a tower in such a manner that it will be free to turn in any direction with the wind.

Four cars are attached to the hull. The forward control car, the passenger car and two wing cars for machinery only are attached on opposite sides of the airship. The control car is of sufficient size to contain all navigating controls, instruments and navigating crew.

A special type of buffer bag and buoyant covering is fitted in the forward car and also to each machinery car. These buffer bags will enable the airship to float on water and will absorb any bump when landing. The airship will be fitted with four Wolseley-Maybach engines of 240 nominal horsepower each. This engine is specially developed for airship work.

Arrangements are under consideration for preparing this ship to fly across the Atlantic this summer. The airship will carry a crew of sixteen men and will have ample endurance to cross the Atlantic, carry a good number of passengers and still have a considerable margin to allow for flying against adverse winds.

Canadian Airways Selected

The Canadian Government is planning a series of mail and passenger air routes, as follows:

(1) The "All-Red" Aerial Highway, extending from St. Johns to Quebec, Montreal, Ottawa, and straight west along the line of the Canadian Pacific Railroad to Fort William and Winnipeg, to Regine, Moose Jaw, Medicine Hat, Lethbridge, Calgary, through the Canadian National Parks, Revelstoke, Kamloops, Westminster and Vancouver and Victoria.

(2) The Sunset Airway extending from St. Johns, N. F., to Sydney, Halifax, St. John, N. B.; Frederickton, Edmundston, Riviere du Loup, Quebec, Three Rivers, Montreal Cornwall Prescott Brockville Kingston, Belleville, Cobourg, Toronto, Camp Borden, Owen Sound, Sault Ste. Marie, Port Arthur, Winnipeg, Prince Albert, Saskatoon, through National Buffalo Park, Edmonton, Mount Robson and Jaspar Parks, Yellowhead Pass Prince George, Hazelton, and Prince Rupert on the Pacific.

(3) The Hudson Bay Trail extends from Winnipeg to Port Nelson on Hudson Bay.

(4) The Dawson Trail extends from Victoria and Vancouver to Prince Rupert, Stewart and to Dawson (or via Juneaut by international agreement). From Toronto an extension of the Sunset Airway will run through central Ontario and connect with the Chanute and Bell Airway at Detroit.

Aircraft Cargo Insured

London.—Lloyd's were recently requested to quote on the insurance of an aircraft cargo, consisting of cloth valued at $7,000, for shipment from London to Paris. The rate quoted was 15 per cent for all risks, including theft.

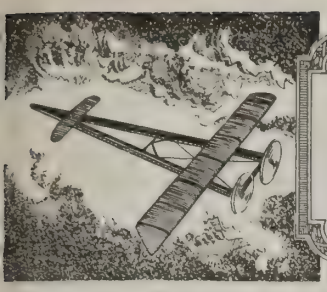
A new corporation, Aviation and General Insurance Co., Ltd., has been organized, with a capitalization of $5,000,000, for dealing in aircraft insurance. Lord Furness is one of the prime movers of the new enterprise.

Another firm, Wheels and Wings Association, Ltd., is offering "flying insurance," and other large and old established insurance concerns are preparing to issue aircraft policies.

Kaiser Makes Another Strategic Retreat

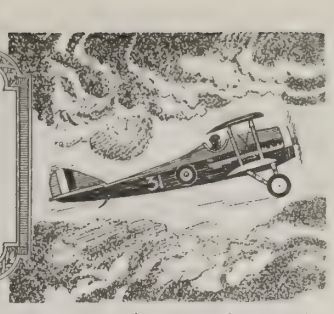
Amerongen, Holland.—Considerable excitement was created at Amerongen Castle, where the fugitive Emperor William is staying, when six aeroplanes appeared suddenly at noon from behind a bank of clouds. They came from the east and, after encircling the castle twice, disappeared in a northerly direction.

The nationality of the machines could not be distinguished owing to the overcast weather, but it is generally assumed that they were Dutch.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



The Motorcycle Engined Aeroplane

(*Continued*)

The tail and rudder are built up in the ordinary way, and covered with muslin also. They are then doped and painted or varnished.

The turtle deck must be made as light as possible, and another thing to remember is that when bracing the body to the rear of the pilot's seat, the wires do not run from the top of the strut just behind the pilot to the bottom connection of the strut following, but instead it goes over to the bottom fitting of the next strut on the opposite longeron. This method does away with the customary cross bracing which holds the body rigid cross ways.

The wheels should be very light, in fact I would specify 20 x 2" and covering them over with muslin doped to insure them being drum tight. This makes a neat stream line wheel. The rim should be of wood instead of steel if possible.

The engine I will describe later, but if the reader wishes to use a standard two cylinder motorcycle engine he can do so; but it might be necessary to use a little more surface and to design some kind of reduction gear arrangement, as it would be impossible to run the propeller at the high speed that a motorcycle would turn up to develop sufficient horse power to insure the machine flying.

The propeller should turn up one to two, that is while the engine turns two times the propeller turns but once. This allows the propeller to turn slower, thereby insuring the maximum efficiency.

The Curve we are using is the U. S. A. No. 1, and a profile is given here with dimensions.

The accompanying cut gives all the dimensions necessary for the building of the Motorcycle Engined Aeroplane, mentioned in the last issue of AERIAL AGE.

The machine when complete should weigh no more than 300 lbs., net weight. This with the pilot and fuel will bring the gross weight to 500 lbs. The U. S. A. Wing Curve No. 1 shows a Ky of .003165 at an angle of 14° at 35 M.P.H. we need

$$\frac{500}{.003165 \times 35^2} = 128 \text{ square feet.}$$

We are using a gap of four feet and a chord of three and a half feet. This combination gives us an efficiency of nearly 100 per cent in our biplane arrangement and we need not add any surface to compensate for theoretical loss.

The spread of the wings being 18 feet and the chord 3½ feet gives us approximately 120 square feet surface, considering the loss of the section over the pilot's head and the ends of the wings.

An engine of the kind I speak of as a Three Cylinder Motorcycle engine develops about 27 horse power, which is considerable for a machine of this light weight, and we should get good speed.

If the person attempting to build this machine should not care to construct a motor of this kind, he could use the W. B. B. Motor, which develops 38 horse power and weighs 130 lbs, and sold by the Lawrence Sperry Aircraft Co., Farmingdale, L. I; the Lawrance 60 horse power aero engine, sold by the Lawrance Aero Engine Corp., No. 644 West 44th Street, New York City. This engine also weighs but 130 lbs., and with this horse power the machine could attain tremendous speeds. Or a fair compromise and one that would just equal the performance of the three cylinder engine I proposed, is the Two Cylinder Opposed Lawrance Motor of 28 horse power and which is the type of motor the Government used on the training penguins. A quantity of these motors are advertised in the advertising columns of this paper by Mr. E. C. Marble, No. 12 South Jefferson Street, Chicago, Illinois.

Any of the motors mentioned above can be used with good results, but of course the greater the horse power the faster you fly. The weights of these motors, being almost alike, one or the other would not change the balance of the machine.

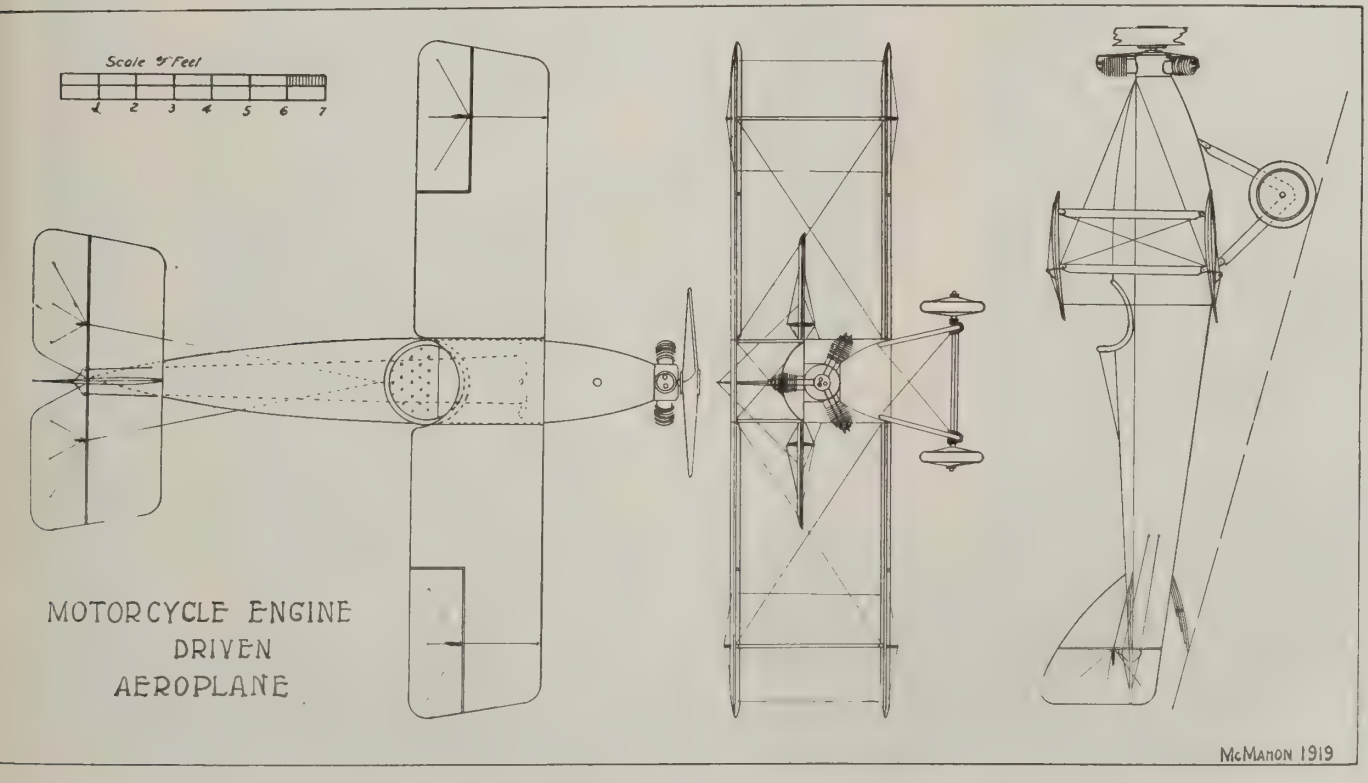
A single set of struts are used instead of two, as on the Ford Motored Machine. The controls are hooked up in the same fashion, and as I mentioned in an earlier article the Ford Motored fittings can be used on this machine.

The covering of the machine is unbleached muslin tightly stretched over the body and the wings, after which a couple of coats of wing dope is applied, and when dry a coat of good outside aero varnish.

A speed of close on to 80 M.P.H. will be attained with a motor of 27 horse power. The wings must be set at an angle of 1° only. 1° means that the entering edge must be about ¾" heigher than the trailing edge.

A machine of this type will be very difficult to handle for an experienced pilot and very cranky in the air.

(*To be continued*)





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Aviation For Journalists

Time, space, everything will be brought by aeroplanes within striking distance of our great dailies. I can foresee news from all over the world side by side every morning with that from our own capital. And evening papers will vie with one another in the swift turn-out of racing and football results, etc. The problem of the future will not be: "Shall I buy a new linotype?" but "Ought I to invest in an aeroplane?"—M. L. N. in *The Newspaper World.*

Lieût. Matchez of this field announces his engagement to Miss Violet Paper, of Los Angeles.—*Ellington Field Tail Spins.*

We happen to know Lieut. Matchez; and we would suggest to Miss Paper that she watch out. She's liable to get burnt.—*Kelly Field News.*



AVIATION IN TIMES OF PEACE

"Yes! Two seats in the first class. You can come up"

—From "La Rive", Paris

This Is the Aeroplane's Day

The wonders of aircraft are come to stay,
For this is now the aeroplane's day,
And the time is coming when we shall see
Travel by airlines, and that there will be
Airships equipped o'er the ocean to fly,
On which 'twill be the fashion, by the bye,
To book passage should one's fancy incline
To visit Europe via "Cloud Line."

There is now a Cloudland mail as we know,
An air route by which our letters may go,
So that in a billet-doux we may say,
"My thoughts, dear, are flying to you today."
The aerial postman skilled must be
In aviation, in order that he
May perform his hazardous tasks with care
In deliv'ring the U. S. mail by air.

In the sporting world, too, we soon shall see,
Many contests for air supremacy,
With the bird-men competing for first place,
And matching their air yachts in a great race
For a cup; and the Fliers from ev'rywhere,
Interested in airsports will be there.
'Tis the world's new sport that is come to stay,
For this is now the aeroplane's day.—*Rose Villar.*

Hee—"What kinds of machines do they use for reconnoitering?"

Haw—"Seaplanes, I suppose."

A Flight to Fame

(*With Apologies to Messrs. Gilbert and Sullivan.*)

When I was a boy I went to war
As an air-mechanic in the Flying Corps.
I dished out dope, and I swung the "prop."
And I polished up my talents in the fitter's shop.
I polished up my talents so carefully
That now I am a General at the Ministry.

As an air-mechanic I made such a name
That a sergeant-major I soon became.
I wore a gay tunic and a Sam Browne belt,
And my presence on parade was acutely felt.
My presence was felt so overwhelmingly
That now I am a General in the Ministry.

As a sergeant-major I made such a hit
I demanded more scope in which to "do my bit."
Of my lofty ways there was never any doubt,
So they sent me up a-soaring in a Sopwith Scout.
I flew so finely over land and sea
That now I am a General in the Ministry.

I worked in France with such amazing zest
That the King grew tired of adorning my breast.
People boosted McCudden and Bishop and Ball,
But they readily agreed that I outsoared them all!
They declared my merit so convincingly
That now I am a General in the Ministry.

Now, air-mechanics all, wherever you may be,
If you wish to climb to the top of the tree,
If your soul isn't fettered to a pail of dope,
Just take my tip—then there's always hope;
Be smart in the Strand at saluting me,
And you all may be Generals at the Ministry.

—G. S. *in "Flying"—London.*

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desire to announce that, consequent upon the interest in, and demand for the "BELLANCA TWO-SEATER" they purpose substituting the **LATEST MODEL 55 H.P. ANZANI AERO ENGINE** for the 35 H.P. "Anzani" specified in previous announcements, and thus effect a still greater degree of efficiency in important directions and service. Notwithstanding the increased cost of production THE ADVERTISED PRICE WILL BE MAINTAINED.

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School Directing and Instructing, Piloting privately owned (commercial or pleasure) machines, Aerial Message and Parcel Delivery, and in all other directions where permanent appointments are possible.

The control and methods of the Bureau recommend themselves to those who may require the services of efficient Air-Pilots in any of the capacities named above, and any information desired will be afforded on request.

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(*Continued from page* 165)

cycles and, later on, for the very first electrical automobiles, which were extremely heavy.

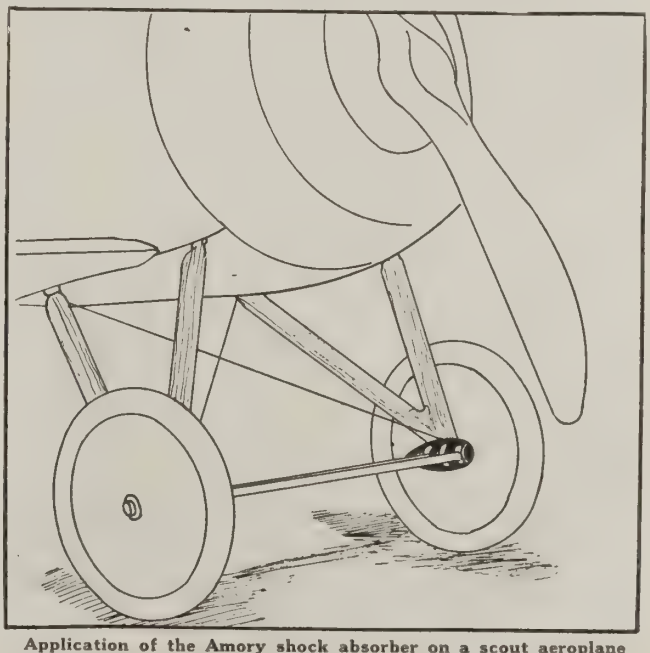
The Amory principle consists of a pneumatic rubber fabric cushion with resilient walls placed between flat metal plates, so arranged that the cushion is double acting and capable of absorbing shocks taken both upward and downward, thereby nulifying vibration. The cushion itself resembles a miniature automobile tire with the air valve on the outside tread. It may be inflated to any desired air pressure by means of a small hand pump. The size of the cushion depends, of course, upon the weight of the machine to which it is attached. It is expected that a pair of these absorbers suitable for the average training plane would probably not exceed 5 or 6 inches in diameter. The design has not as yet been applied to an aeroplane, but its natural evolution from bicycles, carriages, pleasure cars, and heavy motor trucks points the way to its adoption to the most modern vehicle, the aeroplane, where complete shock absorption is of even greater importance than in any of its forerunners.

The practicability of the cushions has been proven, and it merely remains for its designers to work out the actual attachment to the aeroplane. The cushion device might be applied in various ways; for instance, it might take the form of a fitting between the axle and the lower junction of the landing chassis members; it may be employed midway between the axle and the body incorporated in the chassis strut by means of telescoping tubes, or enclosed in a fitting terminating upper ends of landing chassis members.

Single pneumatic cushions may be used, arranged so as to resist the pressure of compression plates fixed respectively to the chassis members on one hand and to the axle or other lower members on the other hand (Fig. 2). These compression plates are alternately arranged and moved past each other as the fuselage moves up and down with the relation to the wheel carrying member.

Another form which this shock absorber may take is in the employment of pairs of pneumatic cushions, one upon the other and taking the landing shock and rebound respectively (Fig. 1). In this case the rebound cushion is brought into play more promptly and is much simpler in operation than the single cushion used for both impact and rebound.

The accompanying diagrams of the Amory air cushion principle, drawn by the Technical Editor of AERIAL AGE, do not represent the finished design, but merely illustrate the principle of action and give an idea of the varieties in which the device may take form. Laboratory experts will make exhaustive tests on the various fittings employing this air cushion principle, and reduce the device to an efficient, simple and compact arrangement that will result in minimization of dangerous rebound and secondary shock in landing.



Application of the Amory shock absorber on a scout aeroplane



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Wings

HUNDREDS of thousands of people who visited the Aeronautical Exposition which ended last night must have realized that we are literally and without exaggeration on the threshold of a new age whose developments the most imaginative can hardly foreshadow. The change in the outward appearance of civilization made by the railroads between 1830 and 1880 will very possibly be far surpassed by the changes which aviation will make in the next half century. A few years ago one of Mr. H. G. Wells's romances predicted the settlement of cities on plateaus now inaccessible, and in oases now shut off by all but impassable deserts—sites which the commercial airship and aeroplane will make as easily attainable as is any seaport today. Even in 1913 this seemed fanciful, but it will hardly seem so to any one who studied the exhibits in Madison Square Garden and the Sixty-ninth Regiment Armory. The dominion of the air has been won, and securely won; and the whole direction of our life is likely to be changed in consequence.

The exhibits were the more striking in that almost all of the recent progress of the art of flying has been made under war conditions, and consequently was kept secret to a very large extent from the public. What we are seeing now revealed is the hitherto largely hidden accomplishment of three or four years of work.

The exhibits of aeroplane accessories were clear indication that within a few years there will grow up around the manufacture of aircraft a trade in accessories not much less important than that now ancillary to the automobile business. But while the commercial possibilities of aircraft may have to wait a few years for their fullest demonstration, their scientific importance can already hardly be overestimated. The aerial photographs shown at the Garden mark a wholly new stage in map making, and there are many other fields in which the conquest of the air will clear the way for the more satisfactory solution of problems that have long hampered geographers and meteorologists.—Editorial in *New York Times.*

New York Needs Nearby Aeroplane Landing Fields

IT is rapidly becoming apparent that it should be made some one's business to have landing fields provided for aeroplanes in the immediate neighborhood of Manhattan. The only regular departures and arrivals of mail carrying aeroplanes hereabout are made so far from the city's centre that a large part of the transit time saved by the speed of the planes is lost in the relatively slow transfer of their loads to the Post Office for sorting and other preparation for delivery. But that is only the beginning of this new traffic; only an incident demonstrating the need we have suggested.

Great things are in prospect for the commercial use of aeroplanes. It means something more than play or sport than an order has been placed involving the expenditure of half a million in planes, equipment and operation for a cross-continent aeroplane line; that in a successful experiment a merchant has delivered to an out of town customer a ton of household goods by aeroplane; that devices are announced which, it is confidently promised, will insure as great stability for a plane in the air as for a barge on the Hudson; that already a plane carrying passengers, its course laid by compass, has flown through fog from Dayton, Ohio to a Long Island field, making its appointed landing with speed and safety.

These things surely must be forerunners of large uses of aeroplanes for mail, express and passenger service, and not in the far future. But where, near Manhattan, are these ships to arrive and depart if the services they offer will not be attended with such delays and inconveniences as to handicap their popularity, restrict their patronage? Van Cortlandt Park has been suggested as offering landing sites; but park space is too valuable for recreational purposes to be otherwise occupied. The New Jersey meadows, drained or filled, neither a difficult undertaking, we are assured with thousands of acres crossed by railways offering quick entrance into Manhattan, suggest themselves. We hope that other and perhaps better adapted sites capable of great extension may be found. But some one who can do things must be alive to this.—Editorial in *New York Sun.*

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Blackburn AIRCRAFT

(*Continued from page* 157)

shaft. The oil pump crankshaft drives the plunger which slides in the oscillating cylinder and an adjustable spring keeps the oscillating cylinder against the oil pump cover, which contains a pressure outlet. The inlet of the oil takes place through the lower tube; a plug is provided at the highest point to allow the air to be expelled from the pump before starting up.

The oil is conducted by a pipe to a union on the top of the main bearer plate; it penetrates the crankshaft and flows through a channel arranged in the aluminium oiling sleeve, from which it passes through oil holes drilled through the crankshaft into the crank web and crankpin.

The small oil channels from the aluminum oil sleeve provide lubrication for the ball bearing and the cam boss ball bearing.

A drilled hole in the crankpin provides oil for the connecting rod thrust block and its bearings.

On leaving the crankpin the oil passes through oil holes in the thrust block, which break through the three grooves in which the heels of the connecting rods run. The oil subsequent to leaving the thrust block is thrown by contrifugal force on to the small ends of the connecting rods, and finds its way into the gudgeon pin bushes and piston bushes.

The oil that lubricates the ball bearings on which the cam boss runs drops by gravity into an annular recess in the cam boss, from which it is thrown by centrifugal force into channels in the cam rockers. Oil holes in the cam rockers conduct the oil to the induction cam roller bush and cam rocker bush.

A sight feed lubricator is provided in the system, which shows by a pulsating movement that the oiling arrangements are in order. The air imprisoned in the glass is compressed at each stroke of the pump piston, and as long as there is indication of this, the pump is giving a regular supply of oil.

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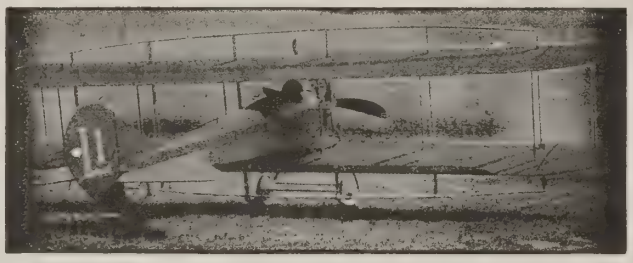
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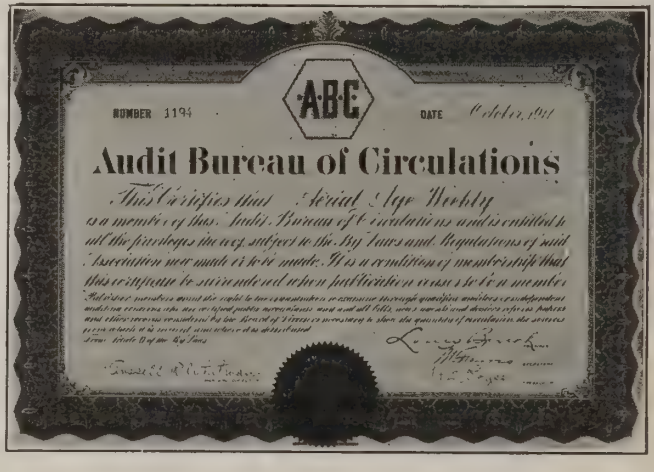
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OCT 20 1919

AERIAL AGE WEEKLY

VOL. 9, No. 4 APRIL 7, 1919 10 CENTS A COPY



British R-33 Dirigible, which may fly to Atlantic City Aeronautic Convention during May

Owners of New York World and St. Louis Post-Dispatch Offer Trophy for Competition at Atlantic City

PUBLISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY



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OWNERS OF NEW YORK WORLD AND ST. LOUIS POST-DISPATCH OFFER TROPHY FOR COMPETITION AT ATLANTIC CITY

$35,000 PRIZES AND TROPHIES

RALPH PULITZER and Herbert Pulitzer, the owners of the New York World and St. Louis Post-Dispatch, have offered a trophy for annual competition, to be open to U. S. Army, Navy and Marine Corps aviators, who will compete in number.

The first competition for this trophy is to be known as the "Aerial Derby," and is to be held in connection with the One Month Aeronautic Convention at Atlantic City, beginning with May 1st and ending May 31st.

The Pulitzer Trophy is to go to the aviator who covers the longest distance in non-stop flight in cross-country flying over land or over water, or both, in flying from any given point to Atlantic City or from Atlantic City to any other point during the month of May.

There are no restrictions as to the type of aeroplane to be used, or the amount of horse power, the purpose of the competition being to demonstrate the great distances that can be covered by present day aircraft, large and small.

It is provided, therefore, that there shall be inscribed on the trophy the name or names of the aviator or aviators who cover the longest distance with one, two, three or four motors. The aviator or crew who has covered the greatest distance in non-stop flight flying aeroplanes of any of the above mentioned classes will be designated as the winner or winners in their respective class.

To facilitate the organization of the "Aerial Derby" the Contest Committee of the Aero Club of America will accept the entries of aviators without the formality of having a special entry blank, provided the entries are made by letter or by telegram, stating the type of aeroplane they will use and the horse-power.

To facilitate the race the Contest Committee will also accept the written statement of the Commanding Officer of the Station from which the aviator starts, or his representative giving the time of departure of the aviator from the station.

In case the aviator has to make a forced landing before reaching Atlantic City or his destination, he will request the local authorities to sign a statement giving the time and place and circumstances of landing, to be forwarded to the Contest Committee of the Aero Club of America.

The aviators who come on land machines can land on the new Atlantic City Aviation Field, which covers 160 acres and affords two runways of 2,500 feet each. Water machines can land on the beach or at the special landing pontoon near the Steel Pier or on the water landing place on the north side of the Aviation Field. The naval seaplanes can then fly to the Cape May Station for the night, if preferred.

The aeronautic movement will be unanimous in expressing appreciation to Messrs. Ralph and Herbert Pulitzer for this evidence of their great interest in aeronautics and the encouragement which the offer of this trophy affords, especially at this time, when every effort should be made to stimulate aerial activity, so that American aeronautics may remain at the forefront.

The offer of the Pulitzer Trophy and the holding of the "Aerial Derby" will afford a splendid opportunity for American aviators to again demonstrate their efficiency.

BRITISH AIR MINISTRY TO SEND DIRIGIBLE TO ATLANTIC CITY IN MAY

THE British Air Ministry has sent a cable to Mr. Alan R. Hawley, President of the Aero Club of America, stating that the Ministry is considering flying a British dirigible to Atlantic City during the Second Pan-American Aeronautic Exposition and Convention, which is to be held at Atlantic City from May 1st to June 1st, under the auspices of the Aero Club of America, the Aerial League of America, and the Pan-American Aeronautic Federation.

The Aero Club invited the British Government to send one of its huge dirigibles to Atlantic City for the Convention in May. Following is the cable received:

"Your invitation for British airship to fly to Atlantic City, month of May, is under consideration. A further communication will be made to you shortly.

"(Signed) AIR MINISTRY."

Mr. Hawley stated that the British dirigibles which may come over are the new R-33 or the R-34, which have been launched in the past month. They are rigid, have a hydrogen capacity of about 2,000,000 cubic feet, are 670 feet long, 80 feet in diameter and 95 feet high, and weigh 30 tons, having 30 tons of useful load. They lift about 60 tons. They can easily make the trip to Atlantic City from England in about forty-eight hours, giving the crew Pullman car facilities. It will be de luxe travel.

Recently the R-33 made a trip with 5 officers, a crew of 23, and one passenger. She is equipped with five 250 h.p. Sunbeam motors. It has a cruising radius of 4,800 miles.

ARMY AERIAL ACTIVITIES CO-ORDINATED UNDER ONE HEAD

THE War Department authorizes the following statement from the Office of the Director of Air Service:

Co-ordination of all Army aerial activities under one head—the Director of the Air Service—is the aim of reorganization now under way, that is, the substitution of the fundamental principle which made possible unified operations overseas, for the rather cumbersome methods followed in the United States in the past.

The reorganization is designed to supersede the complicated dual war-time air establishment and at the same time to develop peace time activities, thereby assuring the full use of industrial, training and operation gains achieved during the conflict with Germany.

Major General Charles T. Menoher, who at the time he was recalled to become Director of the Air Service, was commander of the Sixth Army Corps, and throughout its long service at the front, was in command of the Forty-Second (Rainbow) Division. He endeavored to apply to the Air Service the principle of co-ordination which was followed overseas, not alone by the United States, but by Great Britain and France. He found the air establishment in two parts—Division of Military Aeronautics and Bureau of Aircraft Production. This plan of organization was temporary, destined under the terms of war legislation to pass out of existence six months after the signing of the treaty of peace.

Having in mind the problems of the future, General Menoher proposed a reorganization based on the divisional system. As Director of the Air Service he assumes the position of responsibility. As an advisory board, each member representing an important branch of the service, he has designated the following: Col. Walter G. Kilner, Col. Arthur L. Fuller, Col. Henry C. Pratt, Lieut. Col. George B. Hunter, Lieut. Col. B. Q. Jones and Major Charles R. Cameron.

Dealing directly with him also are the air attaches of foreign governments, thus enabling him to keep in contact with developments at home and abroad.

As every division overseas has had a general staff, so the new Air Service has an executive organization. To carry out the policies which he alone formulates, and to attend to the secretarial duties, the Director has designated an executive officer, Col. Milton F. Davis. Where two or more groups are concerned in any action, their activities are co-ordinated by the Executive Officer in carrying out the policies dictated by General Menoher.

The problem of dividing properly the duties of the various branches was solved by turning once more to the divisional system followed so successfully overseas. The work has fallen naturally into four main channels or groups—Training and Operations; Supply; Executive and Administrative; and Information, Publication and Statistics.

The Chief of the Supply Group has charge of supplies, aeroplane engineering, production, procurement, inspection, maintenance, and finance disbursement for the entire Air Service, including both the old branches—Aircraft Production and Military Aeronautics.

The Chief of the Information Group gathers and distributes all information, statistics and publicity. In war time he would have charge of intelligence work for the whole Air Service.

The Chief of the Training and Operations Group directs all training and operations.

The Chief of the Administrative Group is practically the Adjutant General of the Air Service, controlling administration and executive work, personnel, office management, the medical section, cables, correspondence, etc.

Brigadier General William Mitchell assumed charge of the most important activity, that of Training and Operations. Colonel William E. Gillmore became Chief of Supply. Lieutenant Colonel William F. Pearson assumed charge of administration, and Major Horace M. Hickam became Chief of Information. It is to be noted that the Supply, Administration and Information Groups exist practically for the creation and maintenance of the Training and Operation Group. The latter is the most important and has at its head the ranking officer among the branch chiefs—Brigadier General Mitchell.

Each branch chief is directly responsible to the Director of the Air Service, and in this manner the activities of the entire service are co-ordinated in and centered upon the office of the Director.

Again, following the overseas divisional system, the Director has designated the Supply Group as first in the organization, Information as second, Training and Operations as third, and Administration as fourth. This does not imply rank. Each chief is immediately responsible to the Director. The Director designates what action is to be taken, lays down service policies, and co-ordinates the activities of all four branches.

The primary purpose of this organization is to develop the Air Service, co-operate in the advancement of commercial aeronautics, and promote the principle that the United States deserves a leading place in the air, promised by our original application of the principles of mechanical flight.

TRANS-ATLANTIC FLIGHT PROGRESS

ACTING Secretary Roosevelt announced that the destroyer Barney had been ordered to proceed to Newfoundland to investigate the harbor facilities along the coast for the purpose of determining the best base from which the planes could put out overseas and harbors in which landings could be made in the event it became necessary for them to descend during the voyage from Rockaway to the flight base.

Lieut. Comdr. J. L. Kaufman will command the Barney, which is one of the most modern destroyers, and Commander P. N. L. Bellinger, of the trans-Atlantic section of the office of the director of naval aviation, and Lieut. E. F. Stone, of the coast guard, have been detailed to make the investigation.

Unless difficulties with ice floes are encountered, the Barney is expected to return to the United States within about ten days. The officers will submit their report at Washington.

Three of the four seaplanes with which the Navy Department plans to attempt its trans-Atlantic flight are now at the naval air station at Rockaway Beach, from which the flight will start. They are known as the N. C. 1 type of machine. The fourth plane is under construction at the manufacturing plant of the Curtiss Airplane and Motor Corporation, in Garden City.

Minor changes are now being made in all machines at Rockaway Beach, but it is expected that trial flights will be made within a week or ten days, and the actual trans-Atlantic flight started soon after May 1. At least two of the three machines at Rockaway have already flown. Each of the three seaplanes there is equipped with three Liberty motors, having 1,000 to 1,200 combined horsepower. Experiments are now being made in the arrangement of the motors, but it is believed that the final choice will provide for two tractor, or "pulling" propellers, and one "pushing" propeller.

There will be four Liberty motors in the fourth plane, now under construction at the Garden City plant of the Curtiss Company, and these will be arranged in the so-called "tandem type"—that is, two tractor and two "pusher" motors.

The speed of the first three seaplanes has been estimated by the builders at 100 miles an hour, and it is said that at least one of the planes has made approximately that speed in trial flights. The original gasoline consumption plan provided for a sustained flight of sixteen hours, but changes in design have allowed for largely increased storage space.

Other changes contemplate lowering the pilots' station nearer the pontoon, so as to render less dangerous the changing of pilots in flight.

Arrangements are said to be under way for the establishment of a line of destroyers along the route selected at intervals of less than two hundred miles.

Preparatory work is being done at Harbor Grace for the Handley Page Company in connection with the trans-Atlantic flight. The work is on a large scale, involving about $50,000. One square mile has been leased for twelve months and fences, barns, and other structure are being removed from the property. One hundred men will be placed at work on Monday clearing the property and building hangars for aeroplanes.

Machines for the ocean flight are expected to leave Liverpool on April 13 on the Fruness liner Sachem, which will arrive here about ten days later. The flight is planned for the first half of May.

Colonel Ray Collishaw, a Canadian aviator, sailed on the steamship Olympic for England recently to bring back an aeroplane with which to enter the trans-Atlantic contest. He will attempt his flight from Newfoundland early in May, accompanied by Major McKeever and a wireless operator.

Colonel Collishaw expects to accomplish the flight in twenty hours. His machine will be equipped with five motors of 400 horsepower each, and will be capable of carrying fifty people and remaining in the air for thirty hours.

Captain Zuloaga, who crossed the Andes Mountains in a balloon in 1916, has asked the permission of the Argentine War Minister to attempt a flight across the Atlantic in an aeroplane. The captain is the Argentine military attaché in Paris. It is not known what type of machine he intends using.

It is stated that Major J. C. P. Wood will pilot a Rolls-Royce motored Short biplane, and that the Whitehead Aircraft Co. are secretly building a huge plane for the attempt.



THE NEWS OF THE WEEK



Captain d'Annunzio to Build Popular Price Aeroplanes

Captain Ugo d'Annunzio, the noted aeronautic engineer and son of the famous Italian poet-aviator, has designed and is constructing an aeroplane which is intended to be in the field of aeronoutics what the Ford is in automobiling.

Captain d'Annunzio's aeroplane is to have a wing span of less than twenty feet, to be capable of landing on any country road, and will sell at $1250.00.

The plane is guaranteed to fly two and one-half hours with a man weighing 165 pounds, and to fly at less than 50 miles an hour, so that anybody can pilot it without special qualifications.

When Captain d'Annunzio announced his new plane at the Aero Club of America he promptly received orders for twelve planes from members of the Club, including one for a member of the Board of Governors of the Club, to be delivered at Atlantic City on May 1st, to be exhibited there and used in the aerial contests to take place at Atlantic City during the Second Pan-American Exhibition, which is to be held beginning with May 1st and ending May 31st.

Captain d'Annunzio has been in this country for over a year, being in charge of the construction of the Caproni aeroplanes built in this country for the U. S. Army. He is one of the leading aeronautic engineers of the world.

The plane can be housed in any good size automobile garage.

Twenty New York Police Aviators Sworn in

Twenty aviators, all veterans of the war, were sworn in as a nucleus of the aviation section of the Police Reserve. They were selected by Colonel Jefferson De Mont Thompson. One hundred and twenty-five applications for the aerial service were made to the Aero Club of America.

Landing places have been obtained at Governor's Island, Van Cortlandt Park and Speedway Park, Sheepshead Bay. Other places, Colonel Thompson said, including roofs of buildings in various parts of the city, are in contemplation.

The aviators took the oath of service in the office of Rodman Wanamaker, Special Deputy Police Commissioner, at Police Headquarters.

The aviators now on duty, subject to call, are Captain Joseph C. Stehlin, No. 3133 Ocean Avenue, Brooklyn; Captain S. Herbert Mapes, Union League Club; Captain Hugo Sunstedt, No. 45 West Eleventh Street; Lieutenant William E. Skillman, No. 315 East Eighteenth Street; Lieutenant Paul Micelli, No. 463 West 159th Street; Lieutenant Leigh J. Bair and his brother, Lieutenant Hilbert L. Bair, No. 274 West Ninety-fourth Street; Lieutenant Edmund C. Roman, No. 363 Twentieth Street, Brooklyn; Lieutenant John Robertson Hoyt, Great Neck, L. I.; Lieutenant Frank Sefern Ennis, No. 165 West Seventy-ninth Street.

Also Ensign J. G. Stewart, No. 662 Madison Avenue; Ensign Frank E. Hutcheon, No. 2787 Boulevard, Jersey City; Ensign Albert Pendleton Taliaferro, Jr., No. 440 Riverside Drive; Pilot Edward L. Smith, No. 540 West 145th Street; Pilot James R. McCaffrey, No. 2739 Bedford Avenue, Brooklyn; Charles Siems, No. 1150 South Ninth Street, Mount Vernon; Charles S. Jones, Garden City, L. I.; John W. Frost, No. 23 West Eighty-seventh Street; Francis P. Smith, Mamaroneck, N. Y., and Hugh Elsasser, No. 327 West Seventy-fifth Street.

Others to be enrolled soon are Lieutenant Charles W. Kerwood, of Bryn Mawr, Pa.; Captain Granville A. Pollock, No. 297 Madison Avenue; Lieutenant Francis Joseph Sweeney, No. 550 Metropolitan Avenue, Brooklyn; Miles E. Kellin, No. 727 Lexington Avenue; William J. Lee, No. 112 West 124th Street, and Leonard Emil Mins, No. 327 West Twenty-seventh street.

Akron Flying Club Races On April 15

Akron, Ohio.—Details of arrangements for the balloon races to be held under the auspices of the Akron Flying Club, of Akron, Ohio, on April 15, at the U. S. Naval Air Station, Wingfoot Lake, Ohio, are being rapidly completed.

The first balloon will start at 4 P. M. and the other contestants will follow at five-minute intervals

The race has been limited to 12 balloons, the following having already made entries:

1. Naval Air Station, Wingfoot Lake.
2. Superintendents Construction Office, Wingfoot Lake.
3. Major Baldwin's office, Akron.
4. Colonel Hensley's office, Akron.
5. Ex-Army men.
6. Ex-Navy men.
7. Goodyear Tire & Rubber Co.
8. Firestone Tire & Rubber Co.
9. B. F. Goodrich Co.

The committee in charge of the race is composed of the following: Ralph Upson, W. C. Young, Lieutenant White, George Hockensmith and Major Baldwin. Lieutenant White and Major Baldwin of the committee are endeavoring to obtain permission and papers for a landing in Canada in case of a northern route for Army and Navy entries.

All pilots must be members of the Akron Flying Club and must have spherical balloon license from the Aero Club of America or the International Federation. Any pilot who loses his balloon will, of course, lose the race, regardless of distance.

A committee will soon be appointed to fix prizes, a description of which will be published later.

Arrangements have been made to furnish transportation for the crowd. This work is under the supervision of George Hockensmith.

The club will have among their guests this summer the leading American aces who will start in July to pilot 40 planes across the United States and who will make a landing in Akron.



Aircraft contributed to New York's hearty reception of the 27th Division. A Glenn Martin bomber is shown over the Flatiron Building and the balloons in the foreground are anchored over "The Arch of Victory"

Washington Airmen Take Senators on Joy Rides

Washington, D. C.—Several Senators during the past week have made their maiden flights over the city of Washington.

Senator Norris and Senator Moses went up in Curtiss machines of the H type, piloted by Lieutenants Lucas and Benjamin. The flights lasted over an hour and both Senators expressed the hope that they might go up again in the near future.

Senators Fletcher of Florida, King of Utah and Sterling of South Dakota were taken up in a Glenn Martin bombing plane piloted by Captain Roy N. Francis, who is likely to pilot an army plane across the Atlantic and who has had more hours in the air than any military pilot.

Representative Cramton was piloted over Washington by Lieutenant Middletown, a Washington pilot.

Senators Myers (Montana) and Kendrick (Wyoming) were passengers in another army plane in a flight over the city lasting about half an hour.

Rickenbacker Lectures for French Wounded

New York, N. Y.—Captain Eddie Rickenbacker, America's ace of aces, who has twenty-six German planes to his credit, lectured on "The Arena of the Skies" at the Metropolitan Opera House on March 25, under the auspices of the American Fund for French Wounded. The proceeds of the lecture went to the fund which is being raised by that organization to build and support an American hospital at Rheims. The French Government has already given the site.

The lecture was illustrated by moving pictures showing Rickenbacker fighting in the air and also showing other American fliers, some of whom have been killed in service. Pictures of German aviators which Captain Rickenbacker obtained from a German pilot when he accompanied the American Army of Occupation into that country after the armistice were shown.

Handley-Page Flies 220 Miles in 134 Minutes

Americus, Ga., March 26.—The big Handley Page aeroplane en route from New Jersey to Houston, Texas, arrived here late to-day, having covered the 220 miles from Columbia, S. C., in 134 minutes. The machine, which is equipped with two Liberty motors, carried a crew of four officers and six enlisted men.

Ferry to Bahamas from Bermuda Contemplated

Palm Beach, Fla.—A large hotel company here, which also operates a hotel at Nassau, is considering the establishment of a ferry service between the two points.

The proposal calls for planes to carry twelve passengers and make the trip in fifty minutes. While the expense has not been worked out, it would be high but not for the sporting fraternity there is here to support the travel. Each plane would carry a wireless outfit, and if it got into trouble and had to alight, would summon the aid of express cruisers held in readiness both at Palm Beach and Nassau.

There will be no lack of passengers, it is said, as the Bahamas is a British possession and therefore beyond the pale of a certain recent constitutional amendment.

Aeroplanes Greet 27th Division

New York City, March 25.—As a feature of the enthusiastic reception tendered by New York City to its 27th Division were the manoeuvres of a squadron of Curtiss planes, a Glenn Martin bomber and several flying boats.

Army Aviator to Pilot Ranch Manager Over 250 Mile Wheat Fields

Ansonia, Conn.—J. Pierpont Morgan has engaged Erhardt Schmitt, son of the Rev. E. B. Schmitt, pastor of Christ Church of this city, to pilot the manager of his 250-mile tract of wheat fields at Hardin, Mont., in an aeroplane. Thus Mr. Morgan solves the problem of getting speedily to any part of the ranch. It is believed Schmitt will be the first man to pilot an aeroplane as agricultural equipment.

On a ranch the size of Mr. Morgan's it was impracticable to build roads to enable the manager to get around the ranch in an automobile, so the owner adopted the aeroplane, which will save much time and undoubtedly will prove to be less expensive. The aeroplane will be equipped with wireless, and stations will be established at intervals on the ranch.

Mr. Schmitt is a wireless operator, and so the manager will be able to keep in touch with every section of the territory. Mr. Schmitt was discharged recently from the United States Army. He was a First Lieutenant in the American Air Service in France.

Baker Tells of Automatically Controlled Aeroplane

Fort Worth, Texas.—Under automatic control, an aeroplane capable of carrying a heavy load and operated without a human guide has made a trip of 100 miles and landed close to the point it set out to reach, Secretary of War Baker disclosed in an address here. He and Gen. Peyton C. March, Chief of Staff, came here to inspect Camp Bowie.

The automatic guide which made such a flight possible, and which has been kept secret, Mr. Baker said, was invented in America. It is designed as an instrument of war, and the Secretary referred to it in describing to his audience the possible horrors of future wars if there is to be no League of Nations.

Secretary Baker did not explain the exact nature of the invention, but he made it clear that the War Department considers it one of the most wonderful pieces of mechanism for war's destructive purposes.

Senator Henderson Pilots Plane in Hour's Flight

Washington.—The first aeroplane flight over Washington of a machine piloted by a member of the United States Senate was made by Senator Henderson (Nevada). In a plane equipped for two pilot control, Senator Henderson ascended with Major W. O Ocker, an army aviator. After reaching a height of 5,000 feet Major Ocker turned over the work of piloting the plane to the Nevada Senator who manoeuvred the plane over the city for about an hour.



Leslie V. Spencer, M.E., newly appointed Special Contributing Editor to Aerial Age, formerly editor of technical publications, Experimental Department, Aeroplane Engineering Division of the Bureau of Aircraft Production at Dayton

Molly Pearson Flies Over New York

New York, N. Y.—Miss Molly Pearson, starring in "Penny Wise" at a Broadway theatre, flew over New York in a Curtiss training type aeroplane, six-cylinder engine, model K-6, the type used in training aviators for war. Joseph Bennett, who was in charge of the Curtiss field at Miami, Fla., was the pilot.

Miss Pearson started from Roosevelt Field, at Garden City, L. I., steering a course over the city to Columbus Circle, and then to Longacre Square.

Washington "Bombed" for Loan

Army aviators flying in six Curtiss machines "bombed" Washington with Victory Loan literature in the form of imitation German bombs. The squadron, headed by Col. R. S. Hartz, commanding officer at Bolling Field, was in the air 35 minutes and dropped 20,000 paper bombs, five of which were orders on the Treasury Department for German helmets.

Coffin Leaves France

Paris, March 1.—Howard E. Coffin is leaving Paris this week for New York via England. Mr. Coffin has been on this side for the past three months and has traveled extensively in England, France, Italy and occupied portions of German territory. Mr. Coffin has been particularly interested while in Europe in everythign concerning aviation development, and particularly the role which America will play in the coming conference to decide on international agreements regarding air navigation.

It is understood that Mr. Coffin will spend but a short time in America in order to attend to his private business matters and then will return to Paris.

To Make Aircraft Parts

New York.—The Aircraft & Motor Products Co. has been formed here, with offices at 299 Madison Avenue, and will manufacture products for aircraft and motor vehicles that have been developed primarily from successful war products. The company has developed a spark plug, has a line of cup greases and gear oils, a bronze bearing metal, and will manufacture aluminum castings, bronze castings and gears. Rayburn Clark Smith of Philadelphia is president, other officers being: Vice-president, H. Allen Dalley, Philadelphia; general manager, Major Harry A. Budd, New York. Branches have been established in Philadelphia and Chicago. The company will brand its products "A-A."

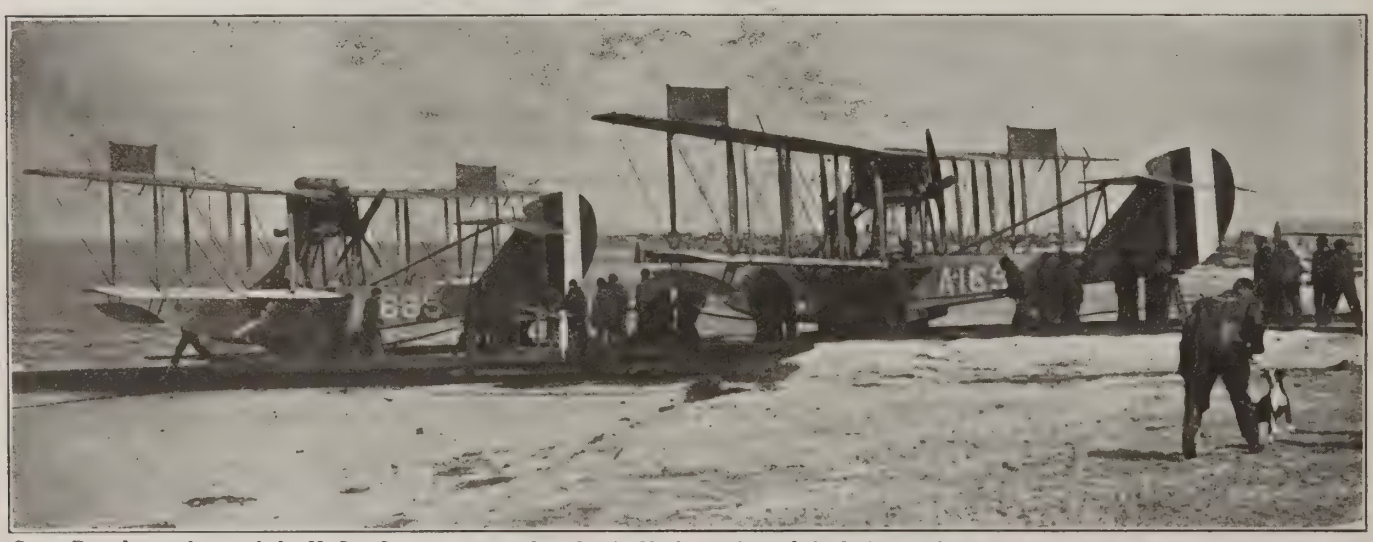
Commander Towers' Aids in Transatlantic Flight Plans Designated

Washington, D. C.—Six officers of the Navy and one of the Marine Corps have been assigned to the transatlantic section of the office of the Director of Naval Aviation for duty in connection with the preparation of plans for the flight across the Atlantic Ocean, which is to be undertaken soon by a big seaplane of the N-C type. The officers are: Commander J. H. Towers, in charge; Commander R. C. Richardson, Construction Corps, experiments; Lieut. Commander P. N. L. Bellinger, operations; Major B. L. Smith, Marine Corps, material; Lieut. Commander G. de C. Chevalier, operations and liaison; Lieut. Commander R. E. Byrd, navigation; Lieut. Barrat, aerographing.

Some of these officers will make the flight, but as yet the crew of the plane has not been selected. Five men probably will be the maximum number to be carried, and, as all weight possible must be sacrificed to fuel-carrying capacity, it may be that only four men will go.

In addition to the two pilots, two mechanicians will be necessary. The commander of the ship will be the navigating officer, and, since he will be an experienced pilot, it has been suggested that he could take turns at driving the machine. Navy officers believe, however, the commander will find it necessary to give all his time to navigation problems.

Several new instruments for use during the flight have been perfected at the Navy Department, but these are carefully guarded secrets. In the preparation of the plans close co-operation is being maintained between the naval officers and the Weather Bureau, which will continue to prepare special charts and data concerning atmospheric conditions, air currents and the like.



Coast Patrol aeroplanes of the H. S. 1-L type stationed at Sandy Hook continue their duties as though enemy submarines were still threatening our coasts. They are in constant communication with shore by radio telephone and telegraph apparatus

Leslie V. Spencer, M. E., Joins Aerial Age Contributing Staff

AERIAL AGE is gratified to announce that it has secured the co-operation of Leslie V. Spencer, M. E., as a special contributing editor, whose writings will appear exclusively in this publication.

Mr. Spencer was editor of Technical Publications, Experimental Department, Airplane Engineering Division, Bureau of Aircraft Production, at the Cook Field, Dayton, until the termination of that publication, and in this capacity he secured a familiarity and knowledge of aeronautical engineering problems which will enable him to write most valuable material.

Mr. Spencer is a mechanical engineer—a graduate of Cornell University, 1911, where he specialized in automotive engineering. For six years he was on the technical staff of the Class Journal Publications.

The first article from Mr. Spencer will appear in next week's AERIAL AGE, and will discuss one of the most important aeronautical developments of the past year, something which has not hitherto been authoritatively discussed in any aeronautic magazine.

Sale of Surplus Air Service Material

The *Salvage Branch, Supply Section,* is charged with entire responsibility in matters pertaining to the sale of all surplus, inactive, and obsolete Air Service material within the Division of Military Aeronautics. In the future no sales of surplus, inactive, or obsolete Air Service material will be made until the Salvage Branch, Supply Section, has been advised.

Flying Field Ambulances

The Training Section, Office of the Director of Military Aeronautics, authorizes the following:

At active fields, an ambulance, with a medical officer and necessary medical personnel, will be on flying field during all flying. Ambulance equipment will include wire cutters, axes, fire extinguishers, etc.

At inactive fields, an ambulance, fully equipped, will be held at a convenient place, ready at all times for immediate action. A medical officer, and other necessary medical personnel, will be in readiness to respond to a call during the time flights are being made on the flying field. Commanding officers of inactive fields will use their judgment in arranging the details necessary to comply with the spirit of the foregoing instructions.

New Commanding Officers for Kelly and Rockwell Fields

The following named field officers were ordered to change station March 11, 1919, as follows:

Colonel Henry H. Arnold, J. M. A., A. S. A., ordered from Coronado, California, to Rockwell Field, San Diego, California, to assume command.

Colonel James E. Fechet, J. M. A., A. S. A., ordered from Houston, Texas, to Kelly Field, San Antonio, Texas, to assume command.

Colonel Henry C. Pratt, A. S. A., ordered from Kelly Field, San Antonio, Texas, to Washington, D. C.

Lieut.-Colonel Leonard H. Drennan, J. M. A., A. S. A., ordered from Washington, D. C., to Chicago, Illinois, for duty as Department Air Service Officer.

Keep Sending Magazines Overseas

General Pershing reports that the American soldiers abroad need reading matter more than ever before. The supply of magazines has dropped from ten to two tons a month, and Red Cross chapters are urged to stimulate the supply.

The decrease is due largely to the misapprehension that the one-cent postage for magazines sent unaddressed to the American Expeditionary Force had been increased to two cents. The one-cent regulation still is in effect and no addressing is necessary. Some of the magazines which dropped the announcement to this effect from their covers will be asked to renew it. Individuals are urged to send all magazines as soon as they have read them. The supply must be doubled or tripled.

Returning Aero Units

The War Department authorizes publication of the following:

The Transport Manchuria sailed from St. Nazaire, March 14th and is due to arrive at New York, March 27th, with the following troops: 636th Aero Supply Squadron, 3 officers, 140 men; 373rd Aero Pursuit Squadron, 4 officers, 152 men; 148th Aero Squadron, 11 officers, 183 men; 142nd Aero Squadron, 3 officers, 158 men; 89th Aero Squadron, 4 officers, 146 men; 36 Aero Squadron, 4 officers, 215 men; 182nd Aero Squadron, 4 officers, 182 men; 341st Aero Squadron, 4 officers, 162 men.

Air Service Attractive to Enlisted Men

Do you know that the Air Service of the Army pays more money to skilled mechanics than can be earned in civil life?

An automobile mechanic earns from $3.50 to $4.50 per day, counting 26 working days per month your salary at $4.50 per day equals $117.00 per month. Your expenses are:

Board and room	$35.00
Clothing (outside)	8.00
Shoes, hats, underwear, etc.	3.00
Doctor's and Dentist's Bills, Hospital and medicines	5.00
Loss of time due to holidays, sickness, etc., 2 days per month.	9.00
Loss of time due to lay off, lack of employment, vacations, etc., 3 days per month	13.50
Total	$73.50

Deduct this amount from your salary of $117.00 per month and you have left $43.50.

If you are a skilled mechanic and have confidence enough in your ability to put your skill to a real test, by enlisting in the Army, you can earn $44. to $121.50 per month, without a single cent of expense. Whether you get the $44. or $121.50, is up to you.

The Air Service of the Army offers steady employment with short hours and no "lay offs"; furloughs are granted with full pay and cheap transportation rates for your trips. When sick, pay goes on just the same. You receive, free, the best hospital facilities and medical treatment.

The Air service of the Army offers excellent opportunity to men between the ages of 21 and 35 who have mechanical inclination, or who are skilled mechanics.

Air Service Mechanics Schools enable the young apprentice to complete his education and become an expert tradesman, and qualify you for large earnings while in the service.

Skilled mechanics are always in demand and can save money through enlistment.

Congressional Flying School

Washington, D. C., March 24, 1919.

The Congressional "flying school," the student aviators of which are to be composed of Senators and Representatives, has a new pupil. Representative C. R. Evans, of Nevada, has followed Senator Charles B. Henderson's lead and "signed up" for a full course at Bolling Field.

Flying 225 miles in 110 minutes, Representative Evans made a trip from Washington to New York by airship recently and established the reputation of being the champion aviator of the Sixty-sixth Congress. He made the flight with Lieut. Lucas, one of the crack pilots of the United States Army, to attend the aeronautical exposition at Madison Square Garden, New York.

What's In a Name?

(*Written Exclusively for* THE AERIAL AGE WEEKLY.)

The securities the Government will issue in the Victory Loan will bear a different name from those in previous loans. They will be notes instead of bonds. What's the difference? Financiers may grasp a distinction. For practical purposes of practical people there is none. The Victory Notes will be promises of the Government to repay the sum advanced for the nation's purposes, just as the previous issues of Liberty Bonds were. They will bear a fair interest as their predecessors did, and will be as safe as the credit of the United States can make them.

In fact, the Victory Notes are calculated to be a somewhat better investment than the previous issues of Liberty Bonds. While the terms of the Victory Loan have not yet been announced, the Secretary of the Treasury has authority to fix interest rates, tax exemption privileges and retirement dates to make them attractive to all classes in the community. It is planned, as a practical measure, to fit them to market demands. Thus the perfectly proper self-interest of the thrifty American investor will dictate the purchase of as many of these Victory Notes as he possibly can see his way to pay for.

At the same time the motive of patriotism in purchasing will not be lacking. The war is not ended in the sense that its obligations have been fulfilled. The Government still has many commitments for war supplies. It must bring the fighters home. It must cure the sick and wounded, and re-educate the crippled so they again may earn their living as self-respecting citizens. The Treasury must be kept in funds to handle the vast problems of the reconstruction period. The war job is not done. Good Americans are not entitled to conclude that their part in the war has ceased.

Victory Notes will enable the loyal citizen to support his government now as he supported it by buying Liberty Bonds when there was fighting overseas. It needs his financial assistance as much now as then; it needs the evidence of his backing to enable it to attack and solve the problems of peace. There never was any question of the success of other loans, because the public understood the need for them and saved and sacrificed in order to raise money. The need now is as great. The response should be as inspiring.

Buy the Victory Notes!

Half-Wing Observer's Insignia Unauthorized

There is no official half-wing insignia known to the Navy Department, hence the wearing of insignia approximating the half-wing of the Army air observer is contrary to regulations. There is also no Navy insignia for radio gunners or engineer gunners. Rating badges for use of petty officers attached to Aviation Corps, as described in Changes No. 17, Navy Uniform Regulations, March 18, 1918, remain as of that date. This circular states: "These rating badges are provided for the ratings of chief petty officer, first class petty officer, and second class petty officer in all three branches. They will conform in all respects to the regulations for rating badges as incorporated in Articles 207 to 210, inclusive, of Uniform Regulations, United States Navy, 1913, except the eagle shall be one and three-quarter inches above the angle and just above the specialty mark." The rating badges shown in this circular are for chief quartermaster, carpenter's mate, first class; machinist's mate, second class.



Officers of the Trans-Atlantic Section of the Office of the Director of Naval Aviation Operations. Seated in the centre:—Comdr. J. T. Towers, U. S. N., officer in charge. Standing, left to right:—Lt. Comdr. G. de C. Chevalier, U. S. N., officer in charge of liaison and assistant officer of operations; Comdr. H. C. Richardson, construction corps; Lt. Barrett, U. S. N. R. F., officer in charge of aerographing; Lt. Comdr. P. N. L. Bellinger, U. S. N., officer in charge of operations; Lt. Comdr. R. E. Byrd, U. S. N., navigation officer and Major B. L. Smith, U. S. M. C., in charge of materials and equipment

The AIRCRAFT TRADE REVIEW

A. E. J.

Director of Sales Reports Nearly $1,000,000 in Aircraft Sales

Washington, D. C.—An official statement of the Office of the Director of Sales, War Department, Washington, announces sales of aeroplanes amounting to $319,000 and of aircraft supplies and equipment totalling $679,887 between the dates of March 8 and 14.

General Disque with American International Co.

Brig. Gen. Brice P. Disque, U.S.A., who received his discharge from the Army a short time ago, having served as director of the Spruce Division of the Aircraft Bureau, has been appointed chairman of the export and import branch of the American International Corporation, with headquarters in New York City, according to a press message from Portland, Ore.

Personal Pars.

F. X. Newman has resigned his position with the Wright-Martin Aircraft Corp., New Brunswick, N. J., to become vice-president and sales manager of the Automatic Safety Tire Valve Corp., Long Island City.

Howard M. Benedict, who has been a lieutenant in the Air Service, has been honorably discharged, and has returned to his position with the Oakes Co., Indianapolis. Mr. Benedict is connected with the pressed steel stamping department.

P. E. Barker, who was formerly experimental engineer of the Northway Motor Manufacturing Co., and more recently research engineer at the Aluminum Castings Co., Cleveland, is now in charge of the truck and motor equipment department of the Van Dorn Iron Works Co., Cleveland.

Grant of Land Offered Navy Air Service

Believing that the U. S. Navy is in need of a large inland tract of land for the development of lighter-than-air craft, the business men of Forth Worth and Dallas, Texas, have jointly offered as a gift to the Navy Department for this purpose one square mile of land lying about thirty miles from each place. The gift was offered in a letter received at the Secretary's office this week. The site is considered favorable for the needs of the Aviation Division of the U. S. Navy for lighter-than-air craft construction and experiment. The land offered is valued at approximately $35,000.

85,000,000 Barrels of Gasoline in 1918

Washington, March 25.—Gasoline production in the United States in 1918 was said by Van H. Manning, Director of the Bureau of Mines, to have borne out at least in part the statement of a British Admiral shortly after the cessation of hostilities that "we floated to victory on a sea of oil."

A little less than 50,000,000 barrels of gasoline was produced in the United States in 1916, Mr. Manning stated, while in 1917 the production was increased under the spur of war's necessity to 68,000,000 barrels, an increase of more than 50,000 barrels a day. In 1918 the production was over 85,000,000 barrels. The daily increase for the year over 1917 was about 47,000 barrels.

Fliers Visit Perlas Islands

A report from France Field, Cristobal, Canal Zone, dated February 15, 1919, states that:

A flight to the Perlas Islands was made recently in one of the H. S. 1 L flying boats. This group is situated about 30 miles off the Pacific Coast of the Canal Zone and inhabited by a few pearl fishermen. Due to the coral construction of the islands and reefs in the harbors it is not an ideal situation for the operation of seaplanes.

A report from two Air Service officers who made a reconnaissance of the San Blas Indian territory has been received. At the time of their visit there was certain amount of unrest among several of the tribal chiefs and they were requested to join the Panamanian Police in securing the loyalty of these tribes. They discovered in one instance that the Indians were not loval to Panama because they thought the Colombian flag more beautiful. In another case it was found that the tribe thought Italy still under the jurisdiction of Colombia and was not aware of the existence of the Republic of Panama. One chief refused to haul down the Colombian banner and it was necessary to use force and in doing so one of the native chiefs received a bayonet wound.



Mr. Fay L. Faurote, advertising manager of the Curtiss Aeroplane and Motor Corp., by his energetic work, substantially contributed to the success of the Aeronautical Exposition

Efforts were made to penetrate still further inland but it was impossible to obtain guides.

628 D.H-4 Planes at Front

(*Prepared by Statistics Branch, General Staff, War Department, March 22, 1919*)

628 De Haviland 4 Planes Put in Service at Front Before Armistice

The following table and diagram shows the status of production, shipments and use overseas of De Haviland 4 service planes at the date of the armistice:

	Number	Per cent. of total production
Produced	3,227	100
Floated	1,885	58
Received at French ports	1,185	37
Assembled overseas	1,025	32
Put into service overseas	984	30
Put into service at front	628	19
In commission at front	457	14

Contracts Canceled Up to March 19 Total $480,000,000

The following is a summary of the value of cancellations and suspensions of contracts to March 19, 1919; totals, $480,730,131.

	Value	Per cent. of total
Engines and spare parts	$250,409,982	52
Aeroplanes and spare parts	167,554,386	35
Chemicals and chemical plants	19,852,370	4
Instruments and accessories	13,832,902	3
Balloons and supplies	10,071,035	2
Fabrics, lumber and metals	7,968,324	2
Miscellaneous	11,041,132	2
Total	$480,730,131	

The Testing of Dopes

In discussing the standard tests for testing of dopes and the methods of determining inflammability and rate of burning, a contributor to British publications discusses the merits of the official tests prescribed.

The test for inflammability is to place a small cube 4 mm. of celluloid on top of the fabric and to ignite the cube. It is stated that "the celluloid cube shall not produce more than a slight charring and the fabric itself shall not ignite."

As regards the method laid down under the above specification for measuring the rate of burning, which is to ignite the edges of a hole in the fabric and to measure the time taken for the flame to travel, one cannot take exception to this, beyond suggesting that if the stringency of the test for inflammability were increased the dope that offers the better resistance to ignition should have the preference over one that burns at a slower rate, for when the fabric of an aeroplane wing is once aflame, if it does not blow out the aviator has a very small opportunity of getting to earth in safety.

The correspondent suggests a more efficient method of testing the danger from inflammability. To arrive at the correct relative values of dope in this connection the following tests should be made:

(1) Facility with which flame is put out by the wind, assuming the fabric to have ignited.

(2) Resistance the dope offers to ignition.

(3) Rate of burning if and when the fabric is ignited.

The qualities are placed roughly in their order of importance. If a dope offers a greater resistance to flame it may, as a general rule, be said that it is better than a dope that offers a less resistance to flame, even though the latter burns slower, for the reason that when the fabric is once ignited the short time it takes the wings to burn gives the pilot insufficient time to reach the earth.

Secondly, if the burning is of such a nature that it is easily extinguished by the wind, it will, in turn, be seen that such a dope, even assuming it to ignite more readily, is probably of greater value than one which is harder to ignite but is not blown out by the wind so readily.

The great disadvantage of the Cellulose Acetate Dopes in this connection is that they melt from the heat, and they are, in consequence, the most difficult to put out when once ignited, though, no doubt, something can be said in their favor in connection with the third quality, i. e., rate of burning, as they perhaps burn a little slower than a type of nitro dope made on the lines of "Titanine." The latter, however, offers a greater initial resistance to flame, and also has the advantage of being readily extinguished by the wind.

Until the Air Ministry lays down a definite standard for tautness all comparative dope tests have their value limited. Given a definite standard of tautness the fireproofing quality can, with certain types of dope, probably be increased without overstepping the limit.

In testing dopes for inflammability, they must obviously be applied on double-sided frames, so as to produce, as nearly as possible, the conditions of an aeroplane wing. These frames should, if possible, be moved quickly through the air during the process of sending incendiary bullets through them. And as much more efficient methods of incendiary attack will, no doubt, be found, should the war be prolonged, one should not necessarily limit this to the incendiary bullets at present in use, but should increase the stringency of the test so far as to insure the ignition of the fabric. This would definitely decide which dope offers the greatest resistance to flame, and would show whether the wind caused by the current of air would extinguish it.

The writer is of the opinion that it is not generally realized what a vulnerable target the fabric of an aeroplane wing affords. It is a common thing to read of machines that have had upwards of 30 or 40 bullets through the wings returning to their base without discomfort. Should any one of these cause the fabric to ignite, however, the machine would be doomed.

If we wish to retain the supremacy of the air we must be prepared for all eventualities, and by realizing exactly what might be done against us we should best be able to take the most effective precautions and counter-measures. There is no reason why aeroplanes should not be sent out capable of resisting much more effective media for conveying flame through igniting the fabric than the present tracer bullets. One might readily predict that if the necessity for this does not arise in the present war it is bound to in the next.

These remarks are limited to the possibility of setting machines on fire through the medium of the doped fabric. Ignition of the petrol through a tracer bullet penetrating the tank is quite another matter. The petrol tank, however, does not occupy more than 1 per cent. of the area of the machine, whereas fabric occupies more than 9 per cent. of it.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service

Louis T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service



PILOTS

Ira O. Biffle
Dana C. DeHart
Edward V. Gardner
Lawton V. Smith
Leon D. Smith
Robert F. Shank
Irving Graeb

John A. Jordan, Superintendent, Western Division
Trent C. Fry, Manager, Belmont Park, L. I.
Charles I. Stanton, Manager, College Park, Md.
John M. Miller, Manager, Bustleton, Pa.
O. J. Sproul, Manager, Chicago, Ill.
C. E. McMillan, Manager, Cleveland, Ohio
August Carlson, Manager, Lehighton, Pa.
Harry F. Powers, Manager, Bellefonte, Pa.
William Lindley, Manager, Clarion, Pa.
J. P. Edwards, Manager, Bryan, Ohio
Charles N. Kight, Special Representative

RESERVE PILOTS

Lester F. Bishop
Dan Davison
C. C. Eversole
E. A. Johnson
D. I. Lamb
Frank McCusker
E. H. Lee
Lyman Doty

CHIEF MECHANICS

Frank Tower
Edward C. Radel
Chas. C. King
H. E. Fremming
Albert Cryder

Berlin-Hamburg Air Mail Service

It is stated in the Berlin daily press that an aeroplane service was established between Berlin and Hamburg on March 1. It is intended to make two flights daily in both directions. On the first journey the machine only carried newspapers, but in future letters will be carried.

It is further stated that a daily aerial postal service has been established between Berlin and Frankfort-on-Main.

Caproni Mail Service Between Padua and Vienna

An aerial mail and passenger service was inaugurated on Sunday, March 2, between Padua and Vienna. Caproni machines are being used, and two of these will leave each town every three days.

The first flight on this service was made in four hours and a quarter, a distance of 304 miles being covered. The machines were then piloted by Italian military aviators, and, presumably, they will continue to be employed on this service.

Swedish Air Traffic Co. Organized

A company has been formed in Sweden under the title of the Swedish Air Traffic Co., Ltd., which has been financed by the principal banks of Stockholm for the purpose of establishing aerial traffic lines between Petrograd and London, via Stockholm, and Stockholm and Finland.

British-Dutch Co-operate to Establish Aero Mail

With a view to establishing an aerial mail and passenger service in conjunction with Great Britain, five commissioners, who were sent by the Dutch Government, have arrived in England.

The commission has been in existence for three months, and has made a great deal of progress in preparing for commercial aeronautics in Holland. Several aerodromes are in the course of constuction, including one situated near Amsterdam which covers 250 acres.

Aircraft to Patrol Forests

Washington.—Major Gen. Menoher of the Army Air Service has been instructed to prepare necessary equipment, personnel and other facilities for experiments in co-operation with the Department of Agriculture, in use of aircraft for forest fire patrol work.

Captured Bombers for French Mail Service

Paris.—German bombing aeroplanes of the Friedrichshafen type, which were surrendered under a clause of the armistice, will be used by the Department of Civilian Aviation in transporting foodstuffs between Paris and Bordeaux. The aeroplanes will be equipped to carry three tons of parcels and bundles. Before the end of April the department plans to have in operation an aerial post between Paris and Valenciennes by way of Maubeuge.

Royal Air Force Aerial Mail Services

For some considerable time past local military mail services in France have been successfully run by the R. A. F. Letters have been delivered regularly between Marquise and Valenciennes, Valenciennes and Namur, Valenciennes and Spa, and on other routes. During the period from December 17 to January 25 there were only five days on which no local services were run.

This scheme has now been superseded by a more elaborate one, embracing a long-distance service from Marquise (near Boulogne) right through to Cologne, as well as an extended series of local services.

The through service to Cologne, quite apart from mileage, presents peculiar difficulties which are not usually met with on the frontier routes. Between the flat country of North France and the valley of the Rhine there lies a range of hills rising in places to a height of 2,000 feet. Not only does this stretch of country contain very few places on which a forced landing can be made safely, but thick clouds and bad weather are invariably encountered in this district.

The Handley Page machines which were at first used on this route are now being replaced by D.H.9a machines, which have a greater speed.

A chain of wireless stations has been organized for the transmission of weather reports. In the event of a forced landing the pilot transmits his position to the nearest wireless station. The message is then passed on by wireless or telephone to the nearest R. A. F., or Army, unit, and transport is immediately sent to pick up the mails and to render assistance.

In the event of a pilot losing his way, arrangements are being made whereby he will be able to get into touch with a wireless-directional station, from where he will receive details as to his actual position. These stations will also direct pilots, in bad weather, to the nearest landing ground, and guide them during night-flying.

In connection with this service the establishment of a chain of balloon sections has been arranged. Each section is to maintain a balloon in the air during daylight. Later on these balloons will probably be fitted with signal lights and will remain aloft at night also.

These balloons serve several purposes. In the first place, they will be sent up above the clouds in order to show the position of landing grounds. Each balloon will be marked with signs which indicate its exact locality, thus enabling the aeroplane pilots to check their bearings when weather is bad or clouds are low.

A second useful purpose is that the balloon observers will be able to ascertain the height and thickness of clouds, and the condition of the weather above the cloud layer.

As the intention is to maintain a night service on this route, a chain of lighthouses has also been provided.

Emergency landing grounds have been established at suitable points along the route, in addition to the regular terminals. Telephonic communication is available at the emergency landing-grounds, but, to meet the case of possible forced landings elsewhere, pigeons are carried on all the machines as an additional precaution by which the pilot can immediately make known his position.

When the scheme is fully developed, the weather reports will be passed to the machines by wireless, by ground signals and by balloon signals, so that the pilot will know at each stage of his journey the conditions of the weather ahead.

It must be understood that this service is experimental, and owing to the nature of the country described above, and the time of the year, in which, of course, the weather conditions are the worst possible, the trial is a very practical test, and should provide valuable experience in meeting the difficulties likely to be encountered in eventual regular civil post services.

During the week-end an aerial postal service was established between England and France, mails for the Army of Occupation being conveyed from Hawkinge Aerodrome, near Folkestone, to the Maison Selle, in Northern France, a distance of 80 miles. D.H.9 machines were used, and twenty-three bags of mails were carried.



A French Aerial Ambulance, built by Voisin Brothers, carries full hospital equipment in the lockers mounted below the wings and shown open in the photograph. Two powerful search-lights permit medical assistance to be given at night and a special fuselage is provided for carrying injured



THE PHOTOGRAPHIC GUN

By EDGAR H. FELIX

Formerly Radio Engineer, Signal Corps

AT the time of the entrance of the United States into the war, British aviators were using a gun camera patterned after a Lewis machine gun, with a long lens barrel substituted for the shooting barrel of the machine gun. This camera was designed to make twelve exposures at loading and for each exposure a manual operation was required. In other words, the aviator could only make one shot at a time, an interval being required to advance the film for the next exposure, and could take but twelve pictures before reloading. With the true co-operative spirit that was evinced by all the Allies and especially Great Britain in giving us the benefits of their previous experience in the war, the British authorities turned this gun camera over to our Army men, who in turn gave the Eastman Kodak Company orders to make duplicates of it.

The improvements which our designers made on the British type resulted in the development of the camera so that aviators were trained to become expert aerial gunners in greatly reduced time without unnecessary waste of ammunition. The methods of training aviators in gunnery prior to the invention of the camera gun did not closely simulate actual conditions. It was customary to practice hitting clay pigeons from towers or elevated platforms equipped with standard machine gun mounts. Such platforms, however, are stationary, and firing from them is quite a different operation from aiming and firing from a swiftly moving plane. Secondly, clay pigeons present a mark unlike an aeroplane in flight. The range at which they can be fired at is limited.

Another means employed was to use as targets balloons and parachutes dropped from a high altitude or kites towed from the ground and fired at from planes in flight. None of these marks, however, could perform aerial acrobatics or move at the speeds encountered during aerial combat.

The British type of gun constituted a great improvement, for the aviator could now "fire" a camera, possessing a sight similar to that used on machine guns of types used on planes. The barrel of the gun, however, is much larger in diameter than the Lewis gun, for instance, and has a capacity of only twelve pictures. To take a picture, it is necessary to pull the trigger, and then to advance the film by advancing a lever. The machine gun has to be removed from the ship to permit the fastening of the camera.

When a sample of this gun was submitted to the kodak company, one of the managers at once questioned the need of a heavy separate gun camera with its big lens barrel. Why not have a special camera attachment that could be fastened to the gun itself that the aviator is continually using? The engineering department was given the job of answering the question. Not only did they build a camera that could be attached directly to the gun in place of the ordinary ammunition magazine, but they also produced a camera that could make 100 exposures at one loading, and, like the machine gun, make them in "bursts," continuing fire automatically as long as the trigger is under pressure.

The Gun Camera, Mark 1, as it is officially called, weighs 13 pounds all told and has a lens barrel only 8 inches long and 2½ inches in diameter. It is of metal construction throughout. The magazine of the camera in which is placed a strip of film, instead of being circular as is the cartridge magazine of the machine gun, is oval-shaped; it is fitted with a Lewis gun magazine lock which completely fastens the magazine to the gun camera.

Each gun camera is ordinarily provided with three magazines which are loaded in a dark room. If the embryo fighting aviator, therefore, takes up with him these three magazines loaded to capacity he can "shoot" 300 times. The film in the magazine is ordinary motion-picture film, which travels from a spool in the small end of the magazine past a light trap, where it is exposed, to a reel 5 inches in diameter in the larger end of the magazine. The magazine is 10¾ inches long and 8 inches wide at the larger end.

Now in the Lewis machine gun after a bullet has been fired the gases resulting from the recoil eject the empty cartridge and automatically replace a loaded cartridge, so in order to



Mark I-A Gun Camera mounted on standard Lewis gun



continue firing all one needs to do is to continue pressure on the trigger. With the gun camera something must be substituted for the force of the cartridge charge, and so use is made of a spring which is wound up with a handle similar to that employed in winding up talking-machine motors. The spring is fastened directly to the shaft that turns the 5-inch reel and through a mechanism called a Geneva movement, which causes an intermittent action, to the shutter mechanism in the lens barrel. Thus as the film is moved steadily past the light trap the shutter opens and closes for making the various exposures to show the location of the opposing aeroplane, each opening occurring at the time a machine gun bullet would have been fired. The illustration very clearly shows the mechanism of the camera.

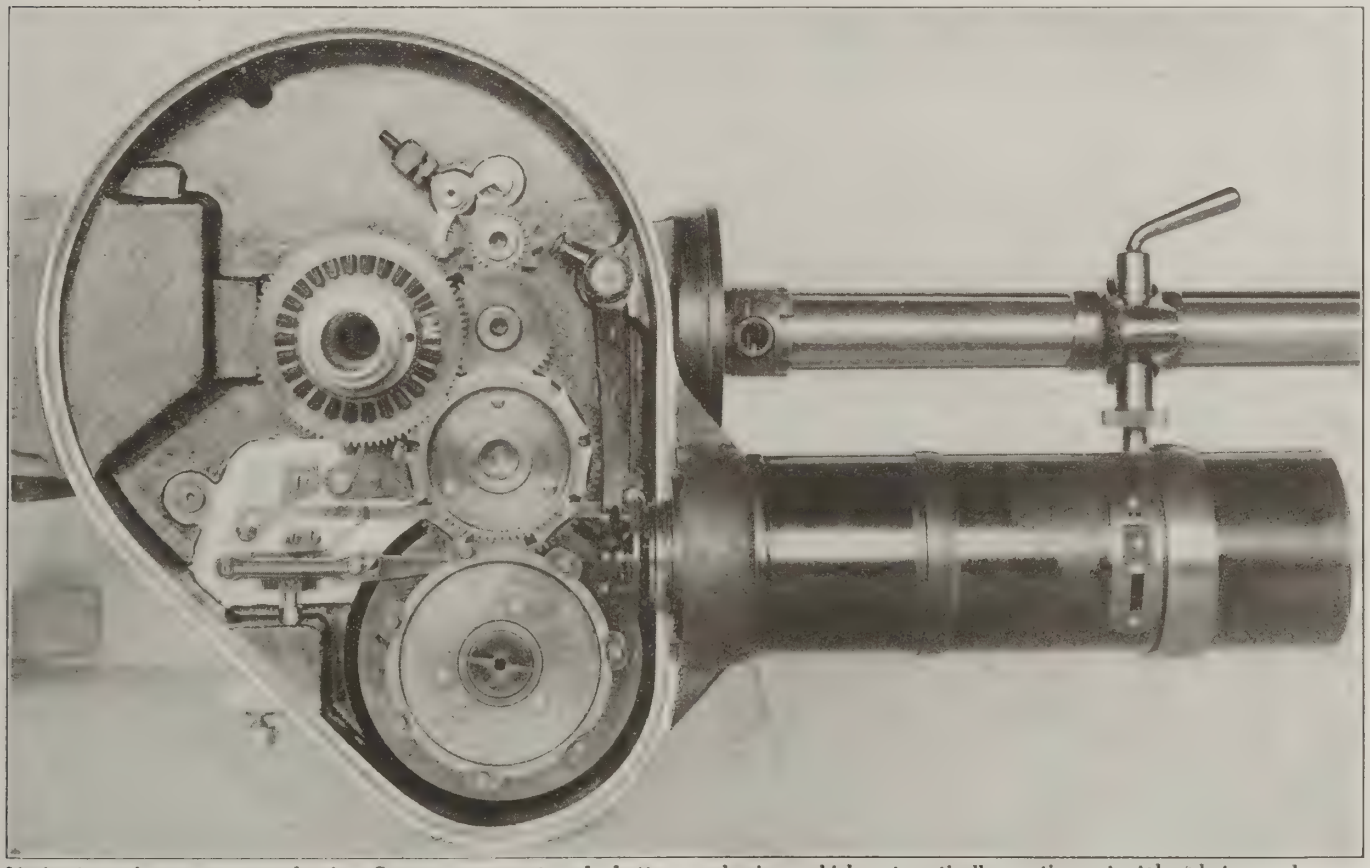
To facilitate spotting the shot from the gun camera, a glass plate called a graticule is placed in the barrel at the focal plane in contact with the film. This plate is marked with a vertical and horizontal line passing through the center and one small circle which one might say indicates the bull's-eye and two large circles drawn close together describing the outer field covered by the camera. These circles and bisecting lines are impressed on the film at each exposure and the position of the opponent aeroplane is indicated by means of them.

Of course, one must realize that in aerial flights machines are going at tremendous speeds and the position of the opposing machine at the time of "firing" (making the exposure) is not quite the same as at the time the bullet reaches the machine. One can tell, however, fairly well by the direction the opposing machine was going as shown on the film whether it would have been hit in a vital spot or not. Thus if the machine is pointed toward the center or bisection of the lines and is very close to the bisection, the chances of its having been hit would have been very good. If the machine had been shown in the same position with regard to the center point but going away from it, the margin of speed would probably just have saved it from being hit. In a straight pursuit a hit is indicated when some vital part of the machine covers up the center of the field. How the opposing aeroplane is shown in flight in relation to the lines of the graticule in the gun camera is indicated in the illustration, which is a reproduction of a strip of film exposed in the gun camera from another aeroplane.

The gun camera is registered properly in relation to the sights of the machine gun to which it is attached by first sighting the machine gun sight on some definite point a certain distance away and then moving the camera so the point of the bisecting lines of the graticule fall exactly on the point on which the machine gun was sighted. The camera is then securely clamped to the machine gun.

The latest improvement on this gun is the attachment of an ingenious timing device which indicates on the film the exact time to fifths of a second at which the photo was taken. It is thereby possible to send up two aviators with their watches exactly in synchrony, and to go through aerial combat tactics and come down with an exact record of the hits scored and who scored the hits first—which under war conditions would represent the victor of the combat. The illustration of the gun does not show this feature, which is to be incorporated into guns in production.

The Eastman Company has also turned out a line of aerial mapping cameras, of automatic and hand-operated types, using both films and plates. They, too, have constituted great advances over existing types.



Mechanism of gun camera, showing Geneva movement and shutter mechanism, which automatically continues to take photos as long as trigger is depressed

SAND TESTING OF AEROPLANES

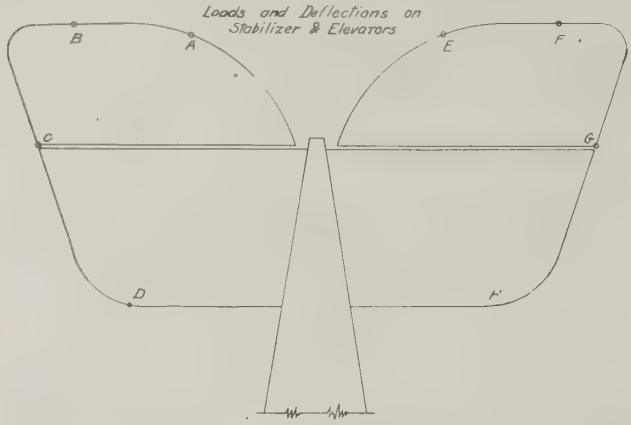
By ALBERT S. HEINRICH

(Continued from page 160)

Test of Tail Surfaces

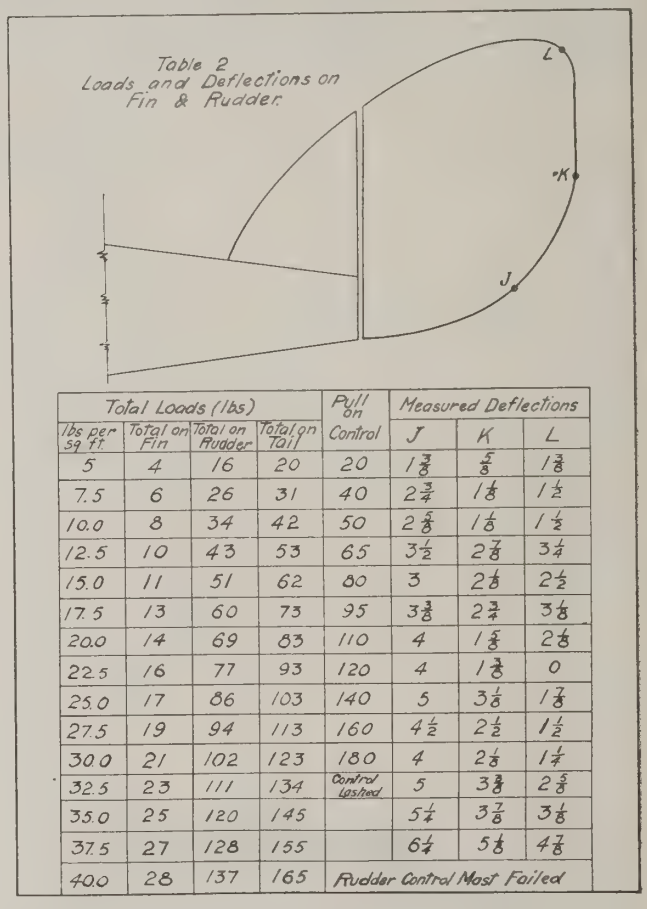
General Dimensions and Description

Figures 1 and 2 are sketches of the tail surfaces of this machine, and show full-size sections and views of some typical parts of the movable surfaces. The spruce ribs were held in place by steel clips brazed around the leading and trailing edges, and screwed to the flanges of the ribs. The elevators had spruce leading edges shown in section B-B, figure 1, and the flanges of the ribs were glued and nailed directly to them with brass brads. At the control masts in each case the ribs were built into a thick block of wood on each face of which the mast was bolted. The trailing edges of the elevators and rudder were of ½", 26 gauge steel tubing flattened as shown in the rudder elevation figure 2, and then wrapped with linen tape to prevent rust affecting the cloth. Each movable surface was held by small hinges taking 3/16" clevis pins.



Total Loads (lbs)				Pull on Stick	Measured deflections at the above points (ins.)							
lbs per sq. ft.	Total on Stabilizer	Total on Elevator	Total on Tail		A	B	C	D	E	F	G	H
5	58	23	104	5	1⅛	2¼			1½	1⅞		
7.5	86	34	154	10	1¼	2¼			1⅛	1⅞		
10	114	45	204	15	1¼	2¾	¼	0	1⅝	2⅛	-⅛	⅛
12.5	142	56	254	25	1½	3	⅛	¼	1⅝	2⅜	0	¼
15	170	67	304	35	1¾	2¾	⅛	⅝	1¼	2¼	0	⅜
17.5	198	78	354	40	2⅛	5	⅜	⅞	2¼	3¾	¼	½
20	226	89	404	50	2½	5	⅜	1	2¼	3⅞	⅛	½
22.5	254	100	454	55	2⅝	5½	⅞	1¼	2½	4⅜	⅛	⅝
25	282	111	504	65	3⅜	5½	¾	1¼	2⅞	5	⅛	⅞
27.5	310	122	554	77	2¾	5½	⅞	1⅜	2⅜	4⅝	⅛	⅞
30	338	133	604	84	3½	6½	⅞	1⅛	3⅛	5½	⅜	1
32.5	366	144	654	Elevator Rib Failed								

Table 1—Results and pull at the controls for each loading of the stabilizer and elevators



Total Loads (lbs)				Pull on Control	Measured Deflections		
lbs per sq ft	Total on Fin	Total on Rudder	Total on Tail		J	K	L
5	4	16	20	20	1⅜	⅝	1⅜
7.5	6	26	31	40	2¾	1⅛	1½
10.0	8	34	42	50	2⅝	1⅛	1½
12.5	10	43	53	65	3½	2⅞	3¼
15.0	11	51	62	80	3	2⅛	2½
17.5	13	60	73	95	3⅜	2¾	3⅛
20.0	14	69	83	110	4	1⅝	2⅛
22.5	16	77	93	120	4	1⅜	0
25.0	17	86	103	140	5	3⅛	1⅞
27.5	19	94	113	160	4½	2½	1½
30.0	21	102	123	180	4	2⅛	1¼
32.5	23	111	134	Control Lashed	5	3⅜	2⅝
35.0	25	120	145		5¼	3⅞	3⅛
37.5	27	128	155		6¼	5⅛	4⅞
40.0	28	137	165	Rudder Control Mast Failed			

Table 2—Results and pull at the controls for each loading of the fin and rudder

The weight and areas of the surfaces are as follows:

Area of pin	1.375	covered wt. 2	lbs.
Area of rudder	6.66	covered wt. 4¼	lbs.
Area of stabilizer	11.44	covered wt. 8	lbs.
Area of elevators	9.00	covered wt. 7½	lbs.
Weight of all fittings		4	lbs.

Procedure

The loading on the stabilizer should be uniform, but on the



Figure 3—Arrangement for testing stabilizer and elevators

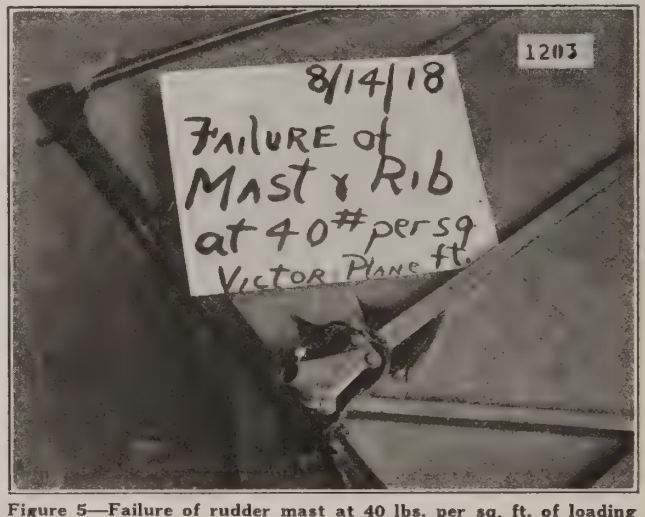


Figure 5—Failure of rudder mast at 40 lbs. per sq. ft. of loading

elevators it should be a maximum on the leading edge, and graduate down to nothing at the trailing edge. The loads should be put on in increments of 5 lbs. per sq. ft. for the first two loads, and 2½ lbs. per sq. ft. thereafter until failure of the surface seams. The same procedure is carried out in testing the rudder and tail fin.

The photograph figure 3 shows the arrangements for testing. The complete fuselage with tail surfaces was set up and supported at the tail post and at front lift fittings by stands. Struts connected the stabilizer to the tail post, which was part of the fin, taking both tension and compression, as shown in figures 1, 2, and 3, and the control cables were connected up with the control in their proper relation. A block and tackle were rigged inside the fuselage, and fastened to the upper end of the ship, and through a 300-lb. spring balance to the top of the joy stick and end of the foot bar for elevators and rudder test, respectively. Before taking deflection reading on the tail surfaces, the tackle was manipulated so that the control masts had their original position, as determined by the position of a point on the control cable. The deflection readings, therefore, give a true indication of the distortion of the frame work of the surfaces. Loads were added as per tables 1 and 2 in increments of 2.5 lbs. per sq. ft. and deflections taken at the points A, B, C, D, E, F, G, and H, as indicated in sketch at head of table 1. All loads were applied uniformly over the surfaces by means of sand bags.

Tables 1 and 2 give the results and pull at the controls for each loading. One of the elevators failed under a loading of 32.5 lbs. per sq. ft. Failure was in the box rib shown at C-C figure 1, and in photograph figure 4, which broke off sharply where it was attached to the control mast block. The rudder failure was at 40 lbs. per sq. ft. when the top of the control

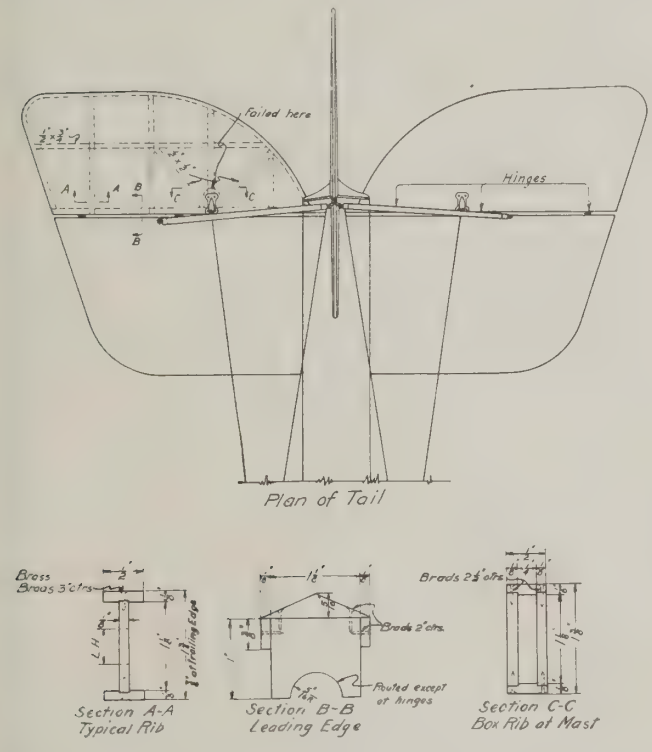


Figure 1.—Plan view of tail surfaces and enlarged sections of typical parts of the movable surfaces

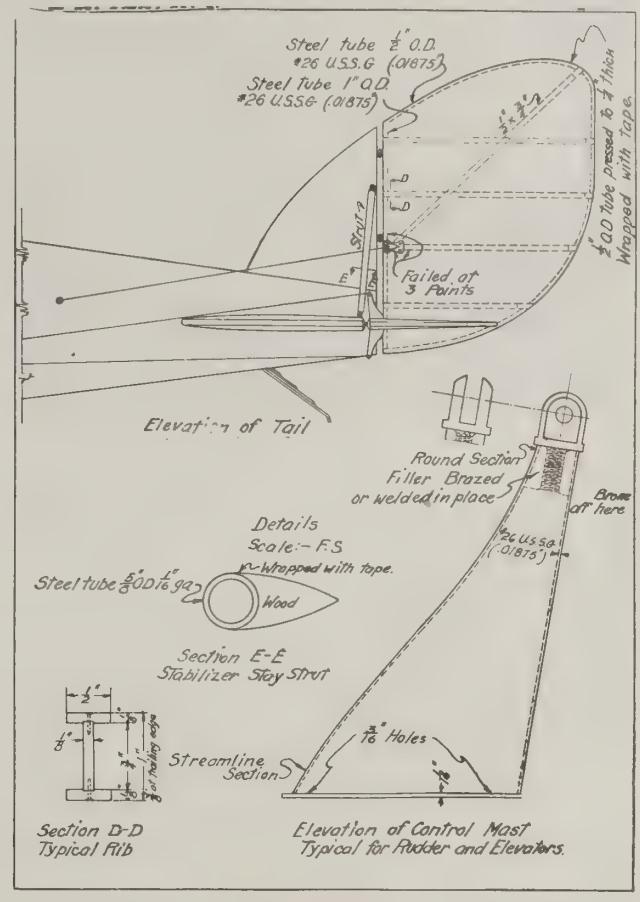
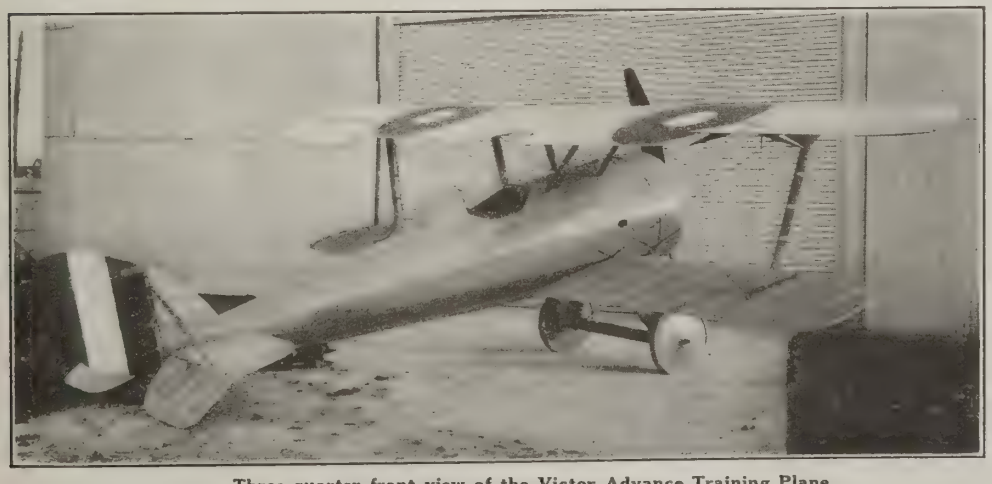


Figure 2—Side view of tail group showing outline and details of the fin and rudder

mast broke off where indicated in figure 2, and as shown in photograph figure 5. When the fabric had been removed, it was found that failure had also occurred in the rib at the mast, and in the leading edge tube between the mast and the adjacent hinge, which evidently was caused by shock when the control mast failed, as there was no evidence of failure in these places before the mast failed. Figure 6 shows the fuselage in position for rudder test.

The strength and weight of the covered surfaces expressed in pounds per sq. ft. are enumerated below for the Victor and two other designs of steel frame surfaces. These values are all test values, and those for the Kawneer are especially low, due to the poor location of the control masts, although the frame work itself was not much stronger. The unit weights are covered surfaces, and do not include fittings.



Three-quarter front view of the Victor Advance Training Plane

	Elevators		Rudder	
	W.T.	Ultimate load	W.T.	Ultimate load
Kawneer Curtiss J.N.	.8	10	.08	20
Art Metal C.1.....	1.2	35	.65	35
Victor	.8	32.5	.6	40

These values and values for De H-4 and other machines show that the tail of the Victor Aeroplane is exceptionally strong for its weight, and perfectly satisfactory from a structural point of view.



Figure 6—Arrangement for testing rudders

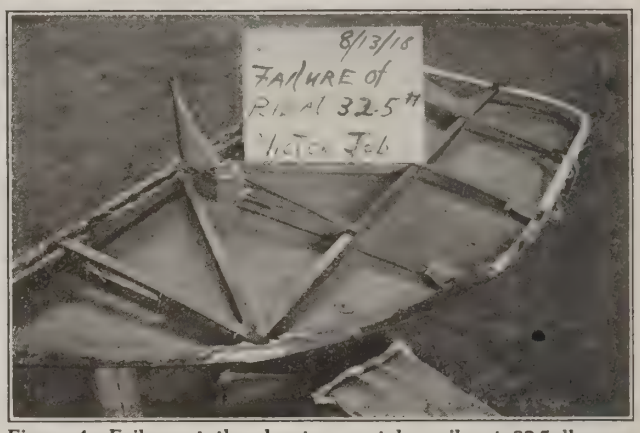


Figure 4—Failure at the elevator mast box rib, at 32.5 lbs. per square foot

Aeronautical Commission Nearing an Agreement

Paris.—The Aeronautical Commission of the Peace Conference held a meeting March 31 to receive and consider reports from sub-committees concerning military, legal, commercial and technical subjects. It was found that the sub-committees had not completed their work, but the commission approved the temporary reports submitted.

It was agreed to put before the Supreme Council the proposals to be finally submitted at the next meeting by the joint Military and Legal sub-committee. Good progress has been made in other directions and a substantial agreement has been reached on important points in connection with the future of commercial aviation.

THOMAS-MORSE S-7 TWO-SEATER

THE side-by-side seating arrangement of the Type S-7 Tractor permits conversation between the pilot and passenger without difficulty. The S-7 has been designed particularly for civilian use, special attention having been directed to comfortable seating arrangement, there being ample room without crowding. The cockpit is lined throughout and in all respects the comfort of the occupants has been given first consideration.

The S-7 is the first machine to be designed for side-by-side seating where a rotary engine is used and it is surprising to note the good streamline form which the body preserves. With an 80-h.p. Le Rhone engine and its 322 square feet of lifting surface the machine can fly at as low a speed as 40 M. P. H. while having a possible high speed of 90 M. P. H.

The general specifications of the S-7 Side-by-Side Two-Seater are as follows:

General Dimensions

Length	21′ 6″
Spread	32′ 0″
Height	9′ 0″

Weights

Total weight loaded	1,480 lbs.
Area lifting surface (including ailerons)	322 sq.ft.
Loading per sq.ft. lifting surface	4.6 lbs.
Required horse power	90
Weight of machine loaded per h.p.	16.5 lbs.

Power Plant

Type of engine	80 h.p. Le Rhone (air cooled rotary)
Engine revolutions per minute	1,250
Fuel capacity	20 gallons
Fuel duration at full power	2½ hours
Oil capacity	4 gallons
Oil duration at full power	3 hours
Propeller type	2 blade
Propeller diameter	8 feet
Propeller revolutions per minute	1,250

Chassis

Type	"Vee"
Wheels	2 (tread 5 ft.)
Tires	26″ x 3″

Areas of Control Surfaces—(*square feet*)

Ailerons (four)	40.0
Elevators	16.8
Rudder	8.5
Horizontal stabilizer	14.5
Vertical stabilizer	3.6

Stick type control used.

Performance

High speed	90 M. P. H.
Low speed	40 M. P. H.
Climb in first ten minutes	6,700 feet



Thomas-Morse Type S-7 80 H.P. Le Rhone engine, side-by-side two-seater, designed particularly for pleasure flying

SECOND PAN-AMERICAN AERONAUTIC CONVENTION AND EXHIBITION

To Be Held Under the Auspices of The Aero Club of America, The Aerial League of America and the Pan-American Aeronautic Federation.

From Thursday, May 1st, 1919,
to
June 1st, inclusive,
at
Atlantic City, N. J.

Intercollegiate Contests Throughout the Summer

CONTESTS TO BE HELD EACH SATURDAY

(1) Seaplane Contests (general),
(2) Curtiss Marine Flying Trophy and Prizes,
(3) Intercollegiate Seaplane Contests,
(4) Land Aeroplane Contests,
(5) Dirigible Contests,
(6) Kite Balloon Speed in Ascending and Descending, and Maneuvering Contests,
(7) Parachute Competition,
(8) Aviette (bicycles and motorcycles with wings) Contests.

EVERY DAY ACTIVITIES

(1) Exhibits of Aeroplanes, Motors and Accessories on the Steel Pier,
(2) Demonstrations and tests of Seaplanes, Land Aeroplanes, Motors, Dirigibles, Kite Balloons, to prospective purchasers and representatives of different governments,
(3) Aerial Passenger Carrying by seaplanes and dirigibles, and kite balloon ascensions,
(4) Moving pictures and Addresses by leading authorities on most important phases of aeronautics.

The Governments and Aeronautic, Sporting, Scientific, Industrial and Civic organizations of the United States and all the countries in the world, excepting Germany and her allies, are invited to send representatives to attend this great aeronautic event. On arrival in the United States these representatives should call at the Headquarters of the Convention Committee at No. 297 Madison Avenue, New York City, to register and receive their official badges and the official program.

In the event that it is more convenient for them to go directly to Atlantic City they will register at the offices of the Convention located at the following Atlantic City hotels: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis and Hotel Haddon Hall.

Representatives of the Convention Committee will be at the Bureaus of the Aeronautic Convention at the above-named hotels and will issue the official badges which admit the bearer to the Aeronautic Hall, as well as the Aero Exhibition on the Steel Pier, the judges' enclosure during contests, and to the Aerodrome and seaplane stations where the aircraft and motors will be demonstrated.

All communications until May 1st, should be addressed to Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

Entries for the competition should be addressed to the Chairman, Contest Committee, Aero Club of America, 297 Madison Avenue, New York City.



DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

THURSDAY, MAY 1ST

Opening of Convention and Exhibit.

AFTERNOON—Reception at Aeronautic Hall on the Steel Pier. Addresses by United States Government State and aeronautic authorities.

EVENING—Aero Show and addresses by officials.

FRIDAY, MAY 2ND

AFTERNOON—Aero Show. Preliminary tests of seaplanes, dirigibles and kite balloons.

EVENING—Moving pictures and address on flying for sport and pleasure.

SATURDAY, MAY 3RD

AFTERNOON—Seaplane and dirigible races, and kite balloon ascending and descending contest.

EVENING—Ball.

SUNDAY, MAY 4TH

MORNING—Memorial service by eminent Divine for the dead airmen.

AFTERNOON AND EVENING—Reception to allied aces and heroes of the air and their parents, and announcement of the award of the Aero Club of America Medal of Valor, and the Aerial League of America Diploma of Honor.

MONDAY, MAY 5TH

AFTERNOON—First parachute contest for $500 Bennett Prize.

EVENING—"The Large Dirigible and Its Value for Transportation." Representatives of railroads, express, steamship and other transportation organizations invited to attend.

TUESDAY, MAY 6TH

AFTERNOON—Illustrated addresses on "Aerial Forest Patrol." Forestry Department of every State invited.

EVENING—"Work of Aerial Police Squadrons, and Why Every City Should Have One."

WEDNESDAY, MAY 7TH

AFTERNOON AND EVENING—Aerial Mail Day. Illustrated address on, and consideration of, "Aerial Mail Planes." Chairman of Post Office and Post Roads Committees of House of Representatives and Senate, and Postmaster General Burleson invited to deliver addresses. (26,000 United States Postmasters, and Chambers of Commerce of 13,000 cities invited to attend.)

THURSDAY, MAY 8TH

AFTERNOON AND EVENING—Illustrated addresses on the "Need of Municipal Aerodromes, and the Part to be Played by Aircraft in City Planning." Chambers of Commerce and City Planning Commissions of 13,000 cities invited to attend.

FRIDAY, MAY 9TH

AFTERNOON—Arrival of seaplanes and army planes from Army and Navy Air Stations. Second parachute competition for the $500 Bennett Prize.

EVENING—Illustrated addresses on "Latest Developments in Aerial Warfare and Adventures in Aerial Warfare," told by famous aces.

SATURDAY, MAY 10TH

AFTERNOON—Army, Navy and Marine Corps Day. Aerial contests and tournament.

EVENING—United States Army and Navy Officers' Reception. Reception and addresses at Aeronautic Exhibition Hall on the Steel Pier.

SUNDAY, MAY 11TH

AFTERNOON AND EVENING—Presentation of the flags by each State of the United States to the Aero Squadrons representing the States. Each State will present a flag to each Aero Squadron, the members of which were overwhelmingly natives of that State. The presentation will be made by representatives from the State and the Aero Club and Aerial League branch of that State. All States and cities invited to send delegates, and Army, Navy and Marine Corps to send representatives.

MONDAY, MAY 12TH

AFTERNOON—Demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night." All national advertisers and advertising agents invited to attend.

EVENING—"Pan-American Aerial Transport Over Land." Addresses by members of the commissions of the 20 Latin-American Republics.

TUESDAY, MAY 13TH

AFTERNOON AND EVENING—"Pan-American Aerial Transport Over Water." Addresses by members of the 20 Latin-American Republics' Commissions.

WEDNESDAY AND THURSDAY, MAY 14TH AND 15TH

AFTERNOONS AND EVENINGS—"The Airways and Aerial Transport in Europe, Canada, Africa, Australia and Asia."

FRIDAY, MAY 16TH

AFTERNOON AND EVENING—"Aerial Navigation Instruments for Flying Over Land and Water." Aviators, navigators, scientific instrument makers and aeronautic experts invited.

SATURDAY, MAY 17TH

AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.

EVENING—Extensive exhibit of aerial photographs and photographic apparatus. All photographers, professional and amateur, and makers of photographic apparatus invited.

SUNDAY, MAY 18TH

AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH

AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."

EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH

AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST

AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.

EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22nd

AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Telegraphic and Climatic Factors in Relation to Aeronautics.

FRIDAY, MAY 23RD

AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulation of Air Traffic." (First day.) Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH

AFTERNOON—Races and contests.

EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH

AFTERNOON AND EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK.

MONDAY, MAY 26TH

AFTERNOON—"Aeronautic Engineering Problems and Their Prospective Solution."

EVENING—Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH

AFTERNOON—"Factors That Increase the Efficiency for Large Dirigibles."

EVENING—"Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH

AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."

EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH

AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."

EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)

AFTERNOON—Dirigible races, kite balloon speed ascending contest; parachute contest.

EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST

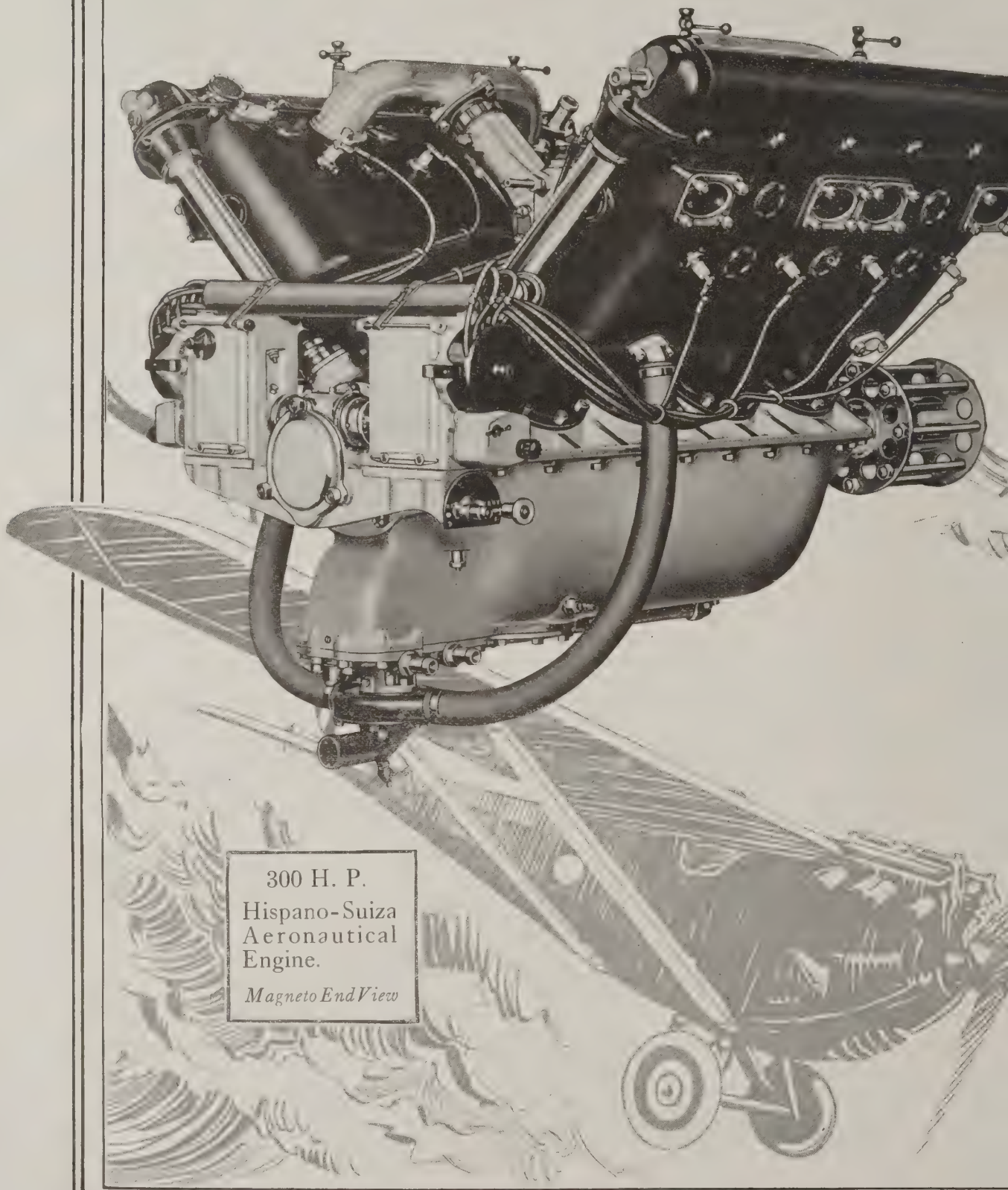
AFTERNOON—Seaplanes, land planes and dirigible contests. Aviette competition at which all cyclists and makers of bicycles and motorcycles will be invited.

EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST

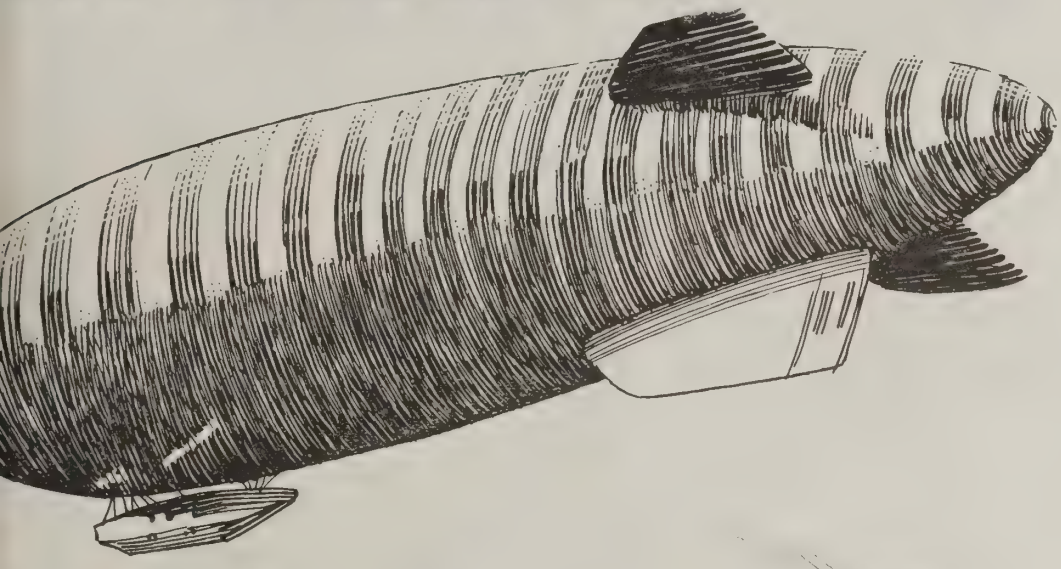
AFTERNOON AND EVENING—Award of prizes and diplomas for all events.

SPEED an



300 H. P.
Hispano-Suiza
Aeronautical
Engine.
Magneto End View

NDURANCE



The brilliant performances of

HISPANO-SUIZA AERONAUTICAL ENGINES

have been substantially recorded on several notable occasions.

These records are milestones in marking the wonderful progress of aeronautical achievements in America.

Manufactured by

Wright-Martin Aircraft Corporation

New Brunswick, N. J.

Air Service Demobilization

Commercial Aerial Transportation Concerns will find it to their advantage to write to

The Aerial Register

(To appear shortly under the auspices of AERIAL AGE WEEKLY)

For NAMES and QUALIFICATIONS of

Pilots
Meteorologists
Aerial Navigators
Aerial Surveyors
Aerodrome Managers
Engine Specialists
Aerial Photographers
Aerial Traffic Managers
Aircraft Inspectors
Wireless Experts
Instructors
Airship Pilots
Rigging Specialists
Aerial Statisticians
Equipment Experts

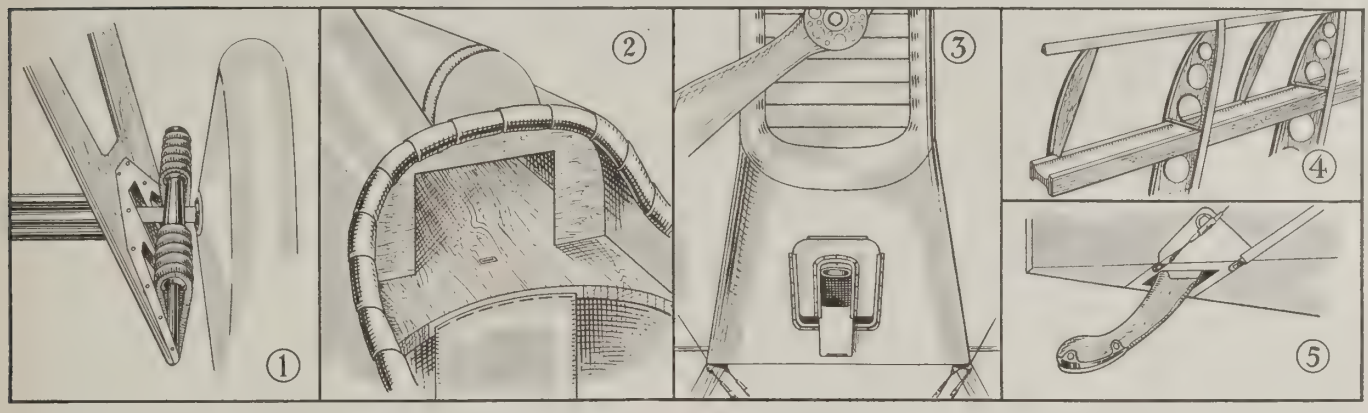
And for INFORMATION CONCERNING COMMERCIAL AERONAUTICS IN ANY PART OF THE WORLD

If **YOU** hold any of the above qualifications, but have not yet registered, you are invited to communicate with the Editor (Air Service Demobilization Department) AT ONCE.

280 MADISON AVE., NEW YORK

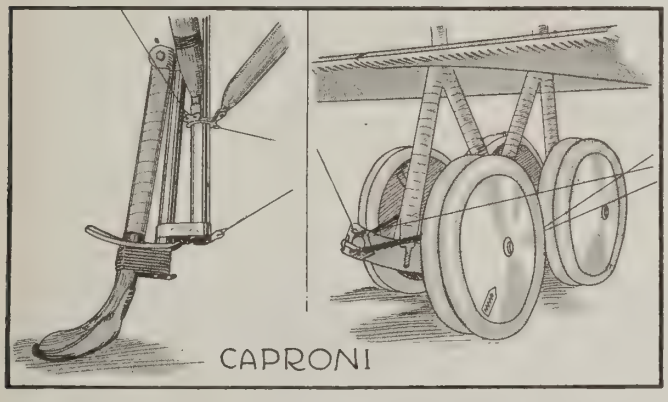
SOME DETAILS OF MODERN AEROPLANES

THE PACKARD TWO SEATER TRACTOR



1—The shock absorber arrangement. The axle is square, where it runs in the chassis slot. The elastic cord is divided into two groups, one fore and one aft of the axle. 2—The roomy suit case locker compartment behind the pilot's seat. A veneer cover with dovetailed edges fits over the opening. 3—Double sliding cover plates are used to permit easy access to the under side of the engine in the vicinity of the air intake, projecting through the fuselage bottom. 4—Wing construction. Webs are of thin mahogany veneer. Cap strips and triangular section leading edge of spruce. Short false ribs run from leading edge to main front beam. 5—Tail skid and anchor plate for stabilizer braces

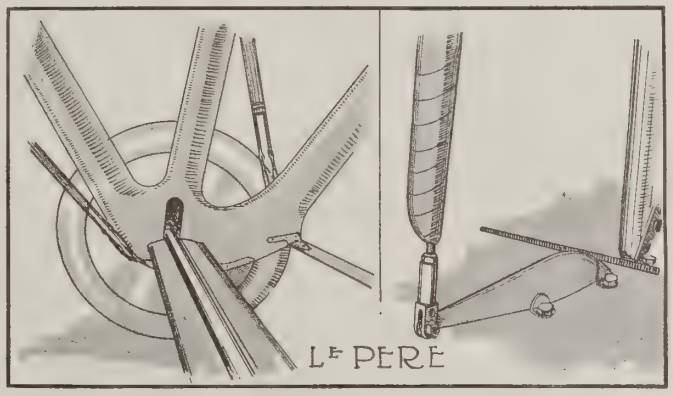
THE CAPRONI TRIPLANE



Left—One of the two tail skids. The skid itself is of ash, wrapped with linen and shod with a metal shoe.

Right—One of the two landing chassis units, composed of four wheels with double rims and double tires

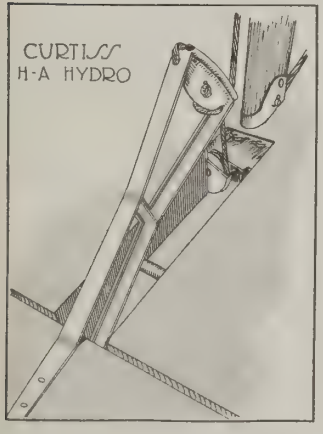
THE LE PERE FIGHTER



Left—Landing chassis. The tension of the rear brace wires is carried from one side of the landing gear to the other by a flat steel strap, following after the axle

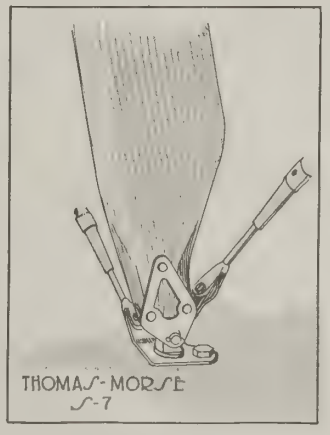
Right—Aileron inter-connecting strut and operating lever, showing the means for adjustment in the upper end of forked terminal

CURTISS



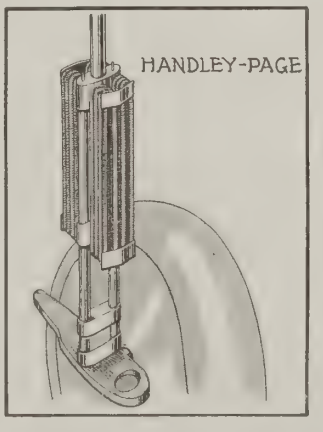
Actuating lever on lower right aileron of the Curtiss H-A Hydro, showing the cable connecting upper and lower ailerons following the interplane strut, and also the cable running through the wing to the control stick

THOMAS-MORSE



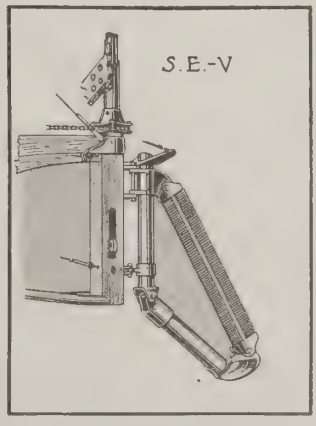
Lower wing fitting at the left outer strut, Thomas-Morse Side-by-Side Tractor; an eyebolt running through the turnbuckle plate attaches the strut fitting to the wing beam

HANDLEY PAGE



One of the four shock absorber units of the Handley Page Bomber. The streamline sheet aluminum casing is removed to show the method of stringing the elastic cord between saddles attached to the fixed brace and the sliding rods respectively

S. E.-V



Tail skid of the British S.E.-V single seater. In the sketch the covering is removed to show the compression springs and the joints. Note also the gear for altering the incidence of the stabilizer

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Olcott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in the order named.

Note 2—Report to Office of Director of Purchase Storage and Traffic for assignment to duty.

Note 3—Report to General Hospital No. 1, New York, N. Y.

Note 4—Report to Camp Normoyle, Fort Sam Houston, Texas.

Note 5—Report to Supply Depot, Middletown, Pa.

Note 6—Report to Supply Depot, Americus, Ga.

Note 7—Report to Camp Dix, Wrightstown, N. J.

Note 8—Report to Camp Grant, Ill.

Note 9—Report to Camp Lee, Va.

Note 10—Report to Governor's Island, N. Y., to General Eastern Department.

Note 11—Report to Camp Funston, Kansas.

Note 12—Report to Aberdeen Proving Grounds, Aberdeen, Md., for duty with 271st Aero Squadron.

Note 13—Report to Chief of Transportation Service, Munitions Building, Washington, D. C.

Note 14—Report to Walter Reed General Hospital, Takoma Park, Washington, D. C.

Note 15—Report to Aviation Repair Depot, Speedway, Indianapolis, Ind.

Note 16—Report to U. S. Army General Hospital No. 31, Carlisle, Pa.

Note 17—Report to Fort McPherson, Ga., to General Hospital No. 6.

Note 18—Report to Hawaiian Department, Honolulu, Hawaii.

Special Orders Nos. 61 to 67, Inclusive

A

Adams, Clarence F.....FOB

B

Berry, Norman K.....DAP
Brady, Wm. C.....DAP
Bleakly, Wm. H.....Note 18
Blaney, John.....PFO
Blee, Harry H.....DAP
Bailey, Elmer S.....Note 18

C

Clark, John M.....KST
Cassels, Thomas B.....Note 5
Claggett, Henry B.....FRF
Curtis, Edward P.....DAP
Caulkins, Ralph M.....Note 18

D

Dinger, Jean T.....Note 14
Delaplane, John W.....Note 15
Duke, Donald G.....Note 18
Doyle, Benton A.....Note 18
Duke, James E., Jr.....Note 18
Dissette, John W.....Note 2

F

Furrow, George C.....Note 18
Fetterhoff, Roy R.....Note 18
Flannery, James.....Note 4

G

Gaines, Albert B., Jr.....CAF
Grant, Thomas A.....ABC
Gray, Ralph C.....Note 13
Giddings, Joseph Attwood.....Note 7

H

Hope, Wellborn.....Note 11

L

Lackey, Myron Elmo.....Note 17
Lannen, Leo V.....DAP
Linkenhoker, Robert Furror.....Note 8
Lanfall, John T.....Note 18

M

McAllen, Wm. D.....Note 13
McIntosh, Lawrence W.....SMM
Maitland, Lester J.....Note 13
Miller, Archie.....HHN
Murphy, Joseph M.....Note 3
Moore, John R.....DAP
Moorman, Ivan G.....Note 13
Miller, Walter.....Note 18

N

Newbold, Edwin E.....Note 18

P

Pearson, Joseph R.....EOT
Putnam, Charles F.....Note 12
Pierce, Hugh M.....Note 18

R

Riddle, Earl Carnes.....Note 7

S

Savage, Charles M.....MAT

T

Tubergen, John B., Jr.....Note 12
Trombly, Herbert A.....Note 6

U

Usher, George L.....Note 10

W

Willard, D. P. A.....Note 16
Weddington, Harry.....EOT
Wooten, Ralph H.....Note 18

Z

Zane, Robert Theodore.....Note 9

Recent Naval Orders

Lieutenant (junior grade) Henry T. Stanley, to duty at naval air station, Key West, Fla.

Lieutenant (junior grade) Ford S. Peterson, to duty naval air station, Key West, Fla.

Lieutenant (junior grade) Donald H. Merrill, to duty naval air station, Coco Solo, Canal Zone.

Will Recommend for Decorations

A Board of Officers to consist of the following personnel is appointed to review recommendations for the Distinguished Service Medal, which have been received at this office, and to make recommendations to the Director of Air Service as to further action:

Brig. Gen. William Mitchell, J.M.A., A.S.A.
Col. Chalmers G. Hall, A.S.A.
Col. Arthur L. Fuller, A.S.A.
Col. Henry C. Pratt, A.S.A.
Lieut. Col. Oscar Westover, A.S., A.P.
Maj. Charles R. Cameron, A.S.A., Secretary (non-voting member).

Air Service Medical

By direction of the Director of Air Service, and by agreement with the Surgeon General of the Army, the Air Service Division of the Surgeon General's Office is discontinued, effective March 14, 1919, and its functions, including the supervision of the commissioned and enlisted personnel of the Medical Department on duty with the Air Service have been transferred to the Chief Surgeon, Air Service.

This new branch will be the Medical Section of the Executive and Administrative Group, and will be under the direction of Chief Surgeon, Air Service, Col. Albert E. Truby, M.C.

Personnel Orders

On March 17, 1919, the following named officers, having reported to the Director of Air Service, Washington D. C., were assigned to duty as indicated:

Lieut. Col. Wm. L. Sheep, M.C., to Administrative Staff.

Maj. Ora M. Baldinger, A.S.A., to Training and Operations.

The appointment of Lieut. Col. Edward E. McCammon, A.S., A. P., as Assistant to Chief, Air Service Materials Inspection, is announced.

Effective March 18, Maj. Maurice Connolly, A.S.A., is relieved from present duty and is assigned to Training and Operations Group.

Col. George H. Crabtree, M.C., and Col. Albert E. Truby, M.C., have been ordered to proceed from Washington, D. C., to Millington, Tenn.; Dallas, Texas; Fort Sill, Okla.; Fort Worth, Texas; San Antonio, Texas; Houston, Texas; and Lake Charles, La., on temporary duty. He will attend an important meeting of flight surgeons at Dallas, Texas, and co-ordinate the work of demobilization and reorganization of the medical service at other stations.

Lieut. Col. Thomas S. Bowen, M.A., A.S.A., was assigned to Training and Operations Group on March 17.

Col. Henry C. Pratt, A.S.A., was assigned to Office of Director of Air Service on March 20, 1919.

Lieut. Col. Henry W. Harms, J.M.A., A.S.A., is relieved from duty as a member of the Advisory Board, Air Service, created March 13, 1919, and Lieut. Col. Byron Q. Jones, M.A., A.S.A., is appointed a member of the Advisory Board, Air Service.

Honorable Discharges

The following officers of the Air Service have been honorably discharged: First Lieut. Herschel Lutes, First Lieut. Joseph O. Freck, First Lieut. Roger W. Andrews, First Lieut. Edward W. Clark, 3d, First Lieut. William R. Kiefer, Capt. D. Dwight Douglas, Capt. Frank B. Makepeace, Jr., Second Lieut. Louis M. Merrick, Maj. James A. Meissner, Maj. Curran S. Benton, Second Lieut. William B. Poynter, Capt. R. Hunter McQuistion, Maj. Cameron B. Waterman, First Lieut. Theron A. Clements, Capt. Truman W. Eustis, Capt. Oscar L. Halsey, Second Lieut. Alan F. Winslow.

Air Service Honors

The Director of the Army Air Service has just received a list of additional honors and awards made to the units and individuals of the Air Service, A.E.F.

The new list includes 21 individuals not previously reported, who have been awarded decorations from the American, British, French and Italian governments, 148 individuals who have been especially cited, and 8 units of the Air Service which have been cited in army or corps orders.

Second Lieut. John MacArthur, who brought down three planes on one day and two on another, is now rated as an American ace. His record was discovered in the following French citation, just received:

"Second Lieut. John MacArthur, 27th Aero Squadron.

"Excellent officer possessing in the highest degree the sentiment of duty. In the course of many combats he has shown the finest courage and greatest self-control. He distinguished himself especially on 13th of June, 1918, when, seeing two reconnaissance aeroplanes attacked by eight Albatros, he brought down three of these and dispersed the others; also on July 2 when, during a combat against nine adversaries, he brought down two of these. (G. O. No. 12,059 'D', G.H.Q., French Armies of the East, 30th November, 1918.)"

103rd Aero Pursuit Squadron Officially Cited

On December 23, 1918, the 103d Aero Pursuit Squadron, formerly the Escadrille, was disbanded. Its last citation from the commanding officer is of interest.

COMMENDATION

Headquarters, 103d Aero Pursuit Squadron,
American E. F.
December 23, 1918.

General Order No. 23:

1. This date the 103d Aero Pursuit Squadron dispatched without mishap all its aeroplanes to the First Air Depot, thus successfully terminating our major responsibility as a combat unit in the American Expeditionary Forces after nine months of active operations.

2. At this time it is my earnest desire to express sincerely and fully to each and every member of the command, both officers and men, my appreciation and admiration of their faithful and willing services so nobly and splendidly performed.

3. In February, 1918, the enlisted personnel of the 103d Aero Pursuit Squadron joined the pilots of the old Lafayette Escadrille and from that amalgamation there came a unit, purely American, that conscientiously and bravely struggled with its daily task of operating against the enemy. Serving as an independent unit for five months under four different French commands, the Fourth, the Sixth, the D.A.N. and the Eighth French Armies, you maintained always a high standard of efficiency. Especially was this true in the Flanders sector where you were able to perpetuate the name of the old Lafayette Escadrille which had its origin under French colors and brought added glory to its flag and traditions by winning a second French Army citation. This last citation should be treasured by all, knowing as you do it was given in recognition of valorous and meritorious operations against the strongest kind of enemy aerial activity in a sector where the whole personnel was nightly subjected to intensive bombardment from the air without affecting its morale or detracting from its efficiency. In July this command came for the first time under the immediate direction of the American Army, and from then until the cessation of hostilities you unceasingly labored with the same indomitable courage, tireless energy and tenacity of purpose that characterized your efforts while with the French.

4. On the eve of your departure to the land for which you have fought, reflect on the record that your Squadron has made and by your appearance and every act show to the people awaiting you that the sacrifices endured and difficulties overcome have not been in vain, but from the mighty test you have come forth valiant soldiers and worthy representatives of your country.

5. The Squadron Commander looks with pride upon your record and considers it a privilege to have served with such an organization.

R. SOUBIRAN,
Captain, A.S., U.S.A., Commanding.

Demobilization of Overseas Personnel

The net decrease in personnel overseas since January 30, is approximately 12 per cent, against a net decrease of 25 per cent in the United States.

	In U. S.	Overseas
Nov. 11	79,321	78,786
Nov. 18	80,689	78,973
Nov. 25	84,785	78,361
Dec. 2	84,844	78,061
Dec. 9	89,661	70,040
Dec. 21	81,607	61,245
Dec. 26	77,140	59,917
Jan. 6	67,833	59,584
Jan. 16	51,821	58,854
Jan. 23	46,467	58,133
Jan. 30	41,314	57,527
Feb. 6	37,537	56,299
Feb. 13	35,479	54,802
Feb. 20	33,240	53,604
Feb. 27	31,111	53,087
Mar. 6	30,823	50,763

Aircraft Production Demobilization of Personnel

According to reports received from the Bureau of Aircraft Production, the net decrease in the total commissioned and enlisted personnel from November 15 to March 11 was approximately 94 per cent.

The distribution and per cent. of net decrease to March 11 are shown below:

	Nov. 15	Mar. 6	Per cent of net decrease
Officers	1,898	649	66
Enlisted men	30,622	1,382	95
Total	32,520	2,031	94

Air Service Reorganization

In connection with the reorganization of the Army Air Service, Major General Charles T. Menoher, has pointed out that the system of staff organization, used overseas, was followed.

The Director of the Air Service is assisted by an executive officer who is his official mouthpiece, being authorized to sign his name and act as his general executive.

Orders No. 5, issued March 19, 1919, by the Director of Air Service, gives the following detailed information:

1. In naming the various subdivisions of this office, the following terminology will be used:
   (a) Headquarters will be known as the office of the Director of Air Service.
   (b) The First, Second, Third and Fourth Assistants will be Chiefs of Groups, known respectively as the Supply, Information, Training and Operations, and Administrative Groups.
   (c) The chiefs reporting directly to the Assistant Executives in any group will be known as Chiefs of Divisions.
   (d) Those subordinates who report directly to Division Chiefs will be known as Chiefs of Sections.
   (e) Subordinates reporting directly to Section Chiefs will be known as Branch Chiefs.

Should any further subdivisions be required, proper designation of the subdivision so formed will be given upon request to this office.

2. Effective this date, all matters arising in connection with Air Service activities other than that pertaining to cancellations of contracts and that which pertains to the approval or authority for funds, will be handled through the Executive Assistants and Division Chiefs of this office in the manner contemplated under the organization outlined in Orders Nos. 1 and 2 of this office.

3. Matters pertaining to the cancellation of contracts and the approval or authority for funds will continue to be handled by the Director of Military Aeronautics and the Acting Director of Aircraft Production, as the case may be, and when necessary, will be referred directly to this office for action.

The Chief of Supply Group has charge of supply, aeroplane engineering, production, procurement, inspection, maintenance and finance disbursement for entire Air Service, in both Aircraft Production and Military Aeronautics.

The Chief of the Information Group gathers and distributes all information, statistics and publicity. In war time he would have charge of intelligence work for the whole Air Service.

The Chief of the Training and Operations Group directs training and operations and is at teh same time Director of Military Aeronautics. This is the office held by Brig. General Mitchell.

The Chief of the Administrative Group is practically the Adjutant General of the Air Service, controlling administration, and executive work, personnel; office management, cables, correspondence, etc.



Editors of the Rich Field Flyer gave a dinner to General Beaumont B. Buck, hero of Catigny, at Waco, Texas. Major John J. Whitesides, commanding officer of Rich Field, acted as toastmaster

FOREIGN NEWS

American Seaplanes Make First Flight in Kingston, Jamaica

Kingston, Jamaica.—At the request of citizens, four seaplanes flew over Kingston before the departure of the fleet of American war vessels which have anchored here for several days. They were visible from all parts of the city, and, as this was the first aeroplane flight ever seen here, some consternation was caused among the natives.

Belgian Government Announces a Paris-Brussels Service

The Belgian Foreign Minister announced on February 26, says *The Times* Paris correspondent, that his Government will permit henceforth an aerobus service to run between Belgium and France. A provisional organization is already formed. Ten aeroplanes, each capable of carrying 12 passengers with luggage, a pilot, and mechanics, 16 persons in all, will be ready in March. They will be well fitted up, going so far as to possess a small library and a bar!

The price of a journey between Paris and Brussels—which includes a life insurance for £4,000—is to be 300 francs (£12), that is to say, a franc a kilometre. A French society will later take over this organization, which is expected to run a service between Amsterdam, Antwerp, Lille and Paris, and thence to Bordeaux and Nice.

Italian Mission to Argentina Takes Planes and Dirigibles

A mission for promoting better trading relations in Argentina has left Italy for that country, taking with it several areoplanes and a small Naval submarine-hunting airship. The former machines include an S. V. A. hydro-aeroplane, a small C.A., something from the Farman peoples' Italian representatives—the Savoia firm of Milan—and other craft, and the airship, it is stated, is a Usuelli product. The well-known pilots composing the mission are all men in the Services, so one scarcely knows whether to call the visit a commercial one, though one hopes that much trade may directly or indirectly be the result of the trip.

Four-Motored Plane for Trans-Atlantic Flight Entered by Dawson

It is understood that the John Dawson Co., Ltd., of Newcastle-on-Tyne, has entered a four-engined aeroplane designed by Mr. C. J. H. M. Kennedy for the "Daily Mail" Trans-Atlantic Competition.

The new machine is said to have a span of 108 ft. and a length of 54 ft. 6 ins., and a speed of 120-130 miles an hour is intended. The machine will be fitted with four Napier "Lion" engines, which will be arranged in pairs in tandem on either side of the fuselage, each pair driving a tractor airscrew. During the attempt on the Atlantic flight, the machine will carry two pilots, a mechanic, and a passenger, and care has been taken to render the accommodation as comfortable as possible, the interior of the machine being heated by the exhaust system.

A Cambridge Chair of Aeronautical Engineering

The following paragraph has appeared in the daily Press:—

Cambridge University has received an offer of £20,000 of 5 per cent. war stock from Mr. Emile Mond, of Hyde Park Square, for the endowment of a Professorship of Aeronautical Engineering, as a memorial to his son, Lieut. Francis Mond, R.F.A. and R.A.F., who was killed in action whilst flying on the Western front on May 15th last.

The Chair is to be designated the Francis Mond Professorship of Aeronautical Engineering.

The Council of the Senate recommended that the offer be gratefully accepted. The proposal is viewed with favor by the Air Ministry.

Unfavorable Air Conditions Off Newfoundland

London.—Warning to beware of "air reefs" off Newfoundland accompanied meteorological details furnished by the British admiralty and the meteorological bureau, it was learned, has been sufficient to hold up the plans of the imminent departure of the great airships R-33 and R-34, for their flight to America. It has just been discovered that a permanent wide area of "air reefs" in the trans-Atlantic route between Ireland and Newfoundland makes the success of even the most powerful airship dubious.

London-Amsterdam Service to be Inaugurated

Plans for an aerial post between London and Amsterdam have been drawn up by a Dutch steamship company, according to the *Telegraaf*, and the British Postmaster-General has expressed himself very sympathetically in regard to them. It is estimated that the crossing will only take two hours, and that a capital of about £83,000 will be required. A Bristol plan provides for the establishment of an aerial service between London and Amsterdam, thence *via* Denmark and Norway and Sweden, and then further *via* Danzig to Petrograd. A service between Amsterdam, Brussels, and Paris is also contemplated.

Air Ministry to Conduct Exhibition Tour Through Europe

It is understood that the Air Ministry is about to inaugurate a series of aeroplane flights to various parts of the world to demonstrate the excellence of British aeroplanes. The first flight will probably be to Madrid, and the start will be made in a few days. It is expected that the machine will be a giant Handley-Page biplane of the type which flew to India recently. Other flights in contemplation are from England to the Cape via Cairo, from England to Australia via Delhi, and from London to Lisbon.

Aviation School in Peru

Lima, Peru.—A military aviation school will be established in Peru, according to a recent decree by the president of the country.

Canada Contributed 8,000 Air Officers

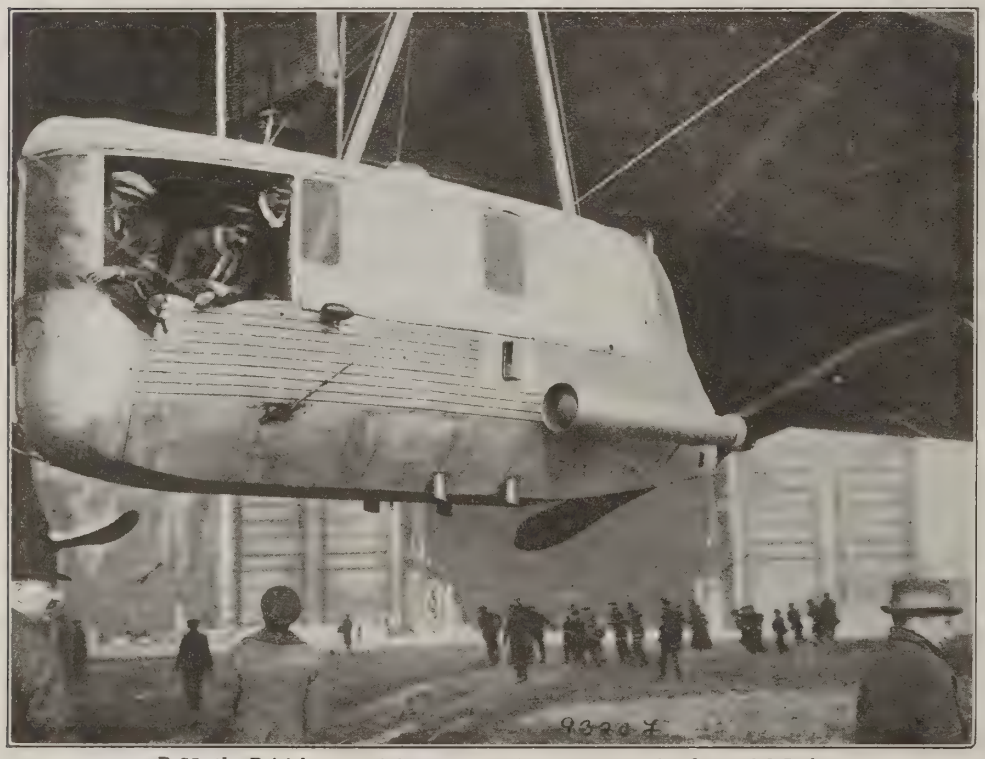
London.—Canada sent 8,000 aviation officers overseas to join the Royal Air Service during the war, according to a statement made at Hendon by Sir Edward W. Kemp, Canadian Minister of Overseas Service. Of these, he said, 4,280 were directly recruited in Canada, and the most of the rest were transferred from the Canadian service to the Royal Air Service after their arrival in Europe.

Sir Edward's statement was made in the course of an address in which he accepted, in the name of Canada, fifteen aeroplanes which had been presented to the Dominion by Canadian and British residents of London, through the Overseas Club. The machines were formally presented by Lord Londonderry, representing the Air Ministry.

Another British Entry in Trans-Atlantic Flight

London.—Another entry for the $50,000 prize offered by the *Daily Mail* for the first flight across the Atlantic was made today in behalf of Maj. J. C. P. Wood, pilot, and Capt. C. C. Wylie, navigator. They propose to make the attempt in an aeroplane of 375 horsepower, capable of a speed of 95 miles an hour when carrying a weight of 2,632 pounds.

Maj. Wood has had considerable experience as an aviator, while Capt. Wylie, in addition to his flying experience, has been navigating destroyers in mid-Atlantic.



R-33, the British trans-Atlantic dirigible, starting on its first trial flight

Argentine-Paraguayan Air Route

Buenos Ayres, Argentina, March 24.—Italian aviators have arrived here to establish an aerial communication system between Buenos Ayres and Ascuncion, the capital of Paraguay.

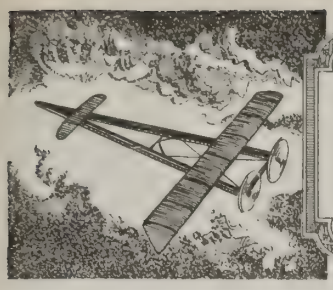
R-34 on 19 Hour Test Flight

London.—The British airship R-34 returned to her base on the Clyde at noon after a flight which kept her in the air continuously for nineteen hours. The itinerary included a flight to Dublin, the circling of the Isle of Man, and home by way of Liverpool and the Midlands. It was intended to remain in the air twenty-four hours and circle Ireland.

The *Evening Standard* says that the next flight of the ship will be over the ocean to make certain tests. An attempt will then be made to cross the Atlantic.

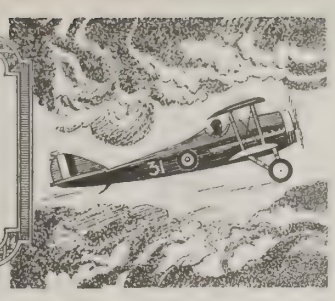
Italian Forlanini Carries 46 Passengers

The Forlanini 6, which was ready in time to get into the war zone and be useful there by carting about high explosives, flew the other week at Milan with 46 people on board. The O. C, Major Gallotti, is reported as having told the journalists that this number could have been increased to 60 if the car could have contained them all.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W., Washington, D. C.
CORRESPONDENCE MODEL AERO CLUB
320 N. Main Street, Rockford, Ills.
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

The Motorcycle Engine Driven Aeroplane

THIS machine was described and the description accompanied by a cut drawn to scale in last week's AERIAL AGE. All the dimensions could be ascertained by using the scale at the upper left-hand corner to determine the size of wings, fuselage, etc.

The sizes of struts and longerons in the body can be determined by scaling the body and deducting the thickness of the longerons, when determining the lengths of the struts, and allowing for the curves when measuring the longerons.

As I mentioned in a previous article, this three-cylinder motor can be built from three ordinary stock motorcycle cylinders, pistons, connecting rods, valves, etc.; the only thing necessary would be the crankcase.

The ordinary motorcycle motor uses a crankcase having but two holes for the cylinders; this one will have to be provided with three holes, spaced at regular intervals around the outside circumference.

It is no easy matter for the ordinary mechanic to construct one of these crankcases, and for this reason I have made arrangements with one of our advertisers to make up these crankcases, which are now being developed, and when ready announcement will be made in the advertising columns of this paper.

For those who wish to attempt the construction of one of these motors the writer will show a sketch in next issue of the general assembly of the proposed motor.

Cylinders from an Indian, Excelsior, Harley-Davidson or Reading motorcycles can be used. The Hendee Manufacturing Company claims for their motor 18 horsepower when running at the maximum speed, and being that we are using three cylinders instead of two we should get at least half again as much power, or, as stated before, 27 horsepower, which gives us a good bit of reserve horsepower for climbing and maneuvering.

Unless a reduction gear is built into the crankcase it will be necessary to use a very low pitch propeller which is not very efficient. A better way would be to have a reduction gear built into the crankcase, reducing the speed of the propeller to one-third or so of the engine speed. To accomplish this it is necessary to fasten a pinion gear to the end of the crankshaft and this turning a gear three times the size, to which is fastened the propeller-shaft.

The most difficult part will be the arrangement of the valve timing apparatus and the ignition, which in a three-cylinder engine must be very ingenious. The order of firing of the cylinders being 1, 3, 2, which you will see means that one cylinder is skipped on each revolution and the motor has one and one-third power impulses each revolution.

For the information of those who did not receive a copy of the first instalment, the fittings which were designed for the Ford motored aeroplane can be used on this machine as well, and also on a two-cylinder ordinary motorcycle engined machine which the writer will start in the next issue of AERIAL AGE.

The Aero Science Club of America

Just in time to enter the coming model aeroplane contests, the Aero Science Club of America has signified its intention of again reorganizing with most of its old members and many new ones on its membership list. This club is the oldest model Aeroplane Club in America, and has graduated some of America's greatest aeroplane mechanics, designers and fliers.

The Aero Science Club was formerly known as the New York Model Aero Club, and was the first in the United States to hold an engine driven model aeroplane contest—the motors being the "Baby" engine constructed of aluminum and having but one cylinder. Such famous aeronautical men as Carisi, Schober, Peoli and Lateiner, as well as a few others whom I cannot remember, competed. These men, with the exception of Peoli, who was killed in the South a few years ago in an aeroplane of his own design, are holding responsible positions in aircraft factories to-day, showing the benefits derived from model aeroplane competition.

More attention should be given to the engine driven model than is displayed by the model enthusiasts, because better prizes will be offered for this type of model than those offered for the rubber-driven type, and the rules allow the model builder to buy his power plant as long as he makes the remainder of the model.

Compressed air and steam engines can be purchased from model aeroplane supply houses for nominal sums of money.

Notice to Builders of the Ford Motored Aeroplane

The Jennings Machine Works, of Uniontown, Pa., one of our advertisers, announce a full line of parts for the Ford motored aeroplane recently described in these columns. These parts are made very strong and carefully as well as neat in appearance, each fitting being dipped in black aeroplane enamel. These fittings are made more elaborate and neater than those which appeared, as those which were given in AERIAL AGE were designed as simple as possible to enable the ordinary mechanic to make them; while these made by the above company are a strict factory production. Control stick, oil pan, propeller hub and special radiator are the other parts that are sold by this concern, as well as the fittings. Machine work and motor parts can be furnished.

Mr. Henry S. Villard Offers Cup

Mr. Henry S. Villard, of the Aero Club of America, has offered his cup for competition again. The Illinois Model Aero Club has two legs on this cup, and if they win it again it is theirs, the rules by which it was presented for competition being the club winning it three times was to get possession of this beautiful trophy, which is now on exhibition in the Aero Club of America rooms.

Mr. Villard is quite an enthusiast, and believes the model aeroplane is the correct method of studying mechanical flight. He is even more interested in the mechanical motor driven models of the compressed air and steam engined type.

Many entries are listed for the coming contests, and I would advise those young men who are alone in their towns or cities to get together their friends and interest them in model aeroplane flying, as it is necessary to have at least five competitors for the flying models contest. The construction and exhibition models can be entered separately, as they will be judged by the photos and the certification accompanying the photos. Get busy, model enthusiasts, as the time is drawing near.



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

A Grand Passion

"She seems interested in that aviator."
"That is hardly the word for it."
"No?"
"She says she loves the very air he flies through."

Lots of Such Cases We're Thinking

An Airnat sent his girl in Indiana a photo of himself. One year later when he returned to the land of the free, he was talking with his girl one night.

"Oh, by the way," he says, "you never did tell me whether you received that photo I sent you about a year ago."

"A photo," she exclaimed, "why, I thought that was one of those puzzle pictures in which you try to find a man's face."

There was a young flyer named Perc.
His flights grew from reckless to worse.
He lost his control
And all his petrol—
He now rides around in a hearse.

An Aviator's Description of a Fair Damsel at a Dancing Party

She was some 5 ft. 4 in. OVER-ALL LENGTH, TRACTOR TYPE, designed somewhat after the Mary Pickford model, faultlessly STREAM-LINED, and her features were slightly radical in design, but showed a very good ASPECT RATIO.



On the Chanute and Bell Airway in 1922—*Courtesy N. Y. Globe*

The ENTERING EDGE of her chin had a very noticeable PHILLIP'S ENTRY. Her nose took the place of a well designed FIN, with deeply CAMBRED eyebrows. Upon VETTING her ears she showed a two-degree DIHEDRAL and the NEGATIVE WASHOUT in the corners of her mouth gave a DERNIERE TOUCHE to her bewitching features. Her complexion at a distance was so CAMOUFLAGED as to give her the appearance of a school girl. Her hair was SWEPT BACK, giving effect of high INHERENT STABILITY with a solid gold CABINE having very little BRACING. Her shoulders would indicate a large KATHEDRAL. She being a TRACTOR TYPE, her FUSELAGE was carefully covered with the finest quality FABRIC and her LONGERONS so designed as to give exquisite effect.

She had a stately and well sprung UNDERCARRIAGE and as she TAXIED about the floor her graceful TAKE-OFF was very noticeable, although she had a slight DUTCH ROLL and a peculiar PITCHING MOTION at first, but she quickly asumed her PROPER POSITION.

In an attempt to test her CONTROLS, together with her RESISTANCE, the CRITICAL ANGLE was found and she started to STALL, giving the observer a beautiful example of HANDS OFF, which immediately showed sufficient FACTOR OF SAFETY.

Owing to a sudden RETREAT a large GAP must be left in the details of description, which leads us to suspect a WARPED disposition.

Although one of the PILOTS reports that she was so PERFECTLY ALIGNED that she responded very quickly to the CONTROLS, especially in a SPIN, and she readily assumed her GLIDING ANGLE.—*The Propeller.*

Huh-uh! Not Me

By An Officer at Scott Field

C'o'se, Ah ain't sayin' Ah won't do
Des what ma country want me to,
But dey's one job dat Ah fo'see
Ain't gwine to 'tach itself to me—
Huh-uh, not me.

Dat's dis heah ahplane stuff—no boss,
Ah'll pack some othah kin' ob cross
Lak, drive a mule, or tote a gun,
But Ah ain't flirtin' wif de sun—
Huh-uh, not me.

Ef Ah mus' do a loop de loop,
Let mine be roun' a bowl ob soup;
'Tain't gwine to be up whah de crows
Kin say Ah's trompin on deh toes—
Huh-uh, not me.

It sho look sweet, Ah don't deny,
To be a-oozin' roun' de sky,
But dat's fo' folks dat's in de mood
To pass up love an' gin an' food—
Huh-uh, not me.

Down heah Ah firs' saw light ob day,
Down heah am whah Ah's gwine t' stay;
Folks, Ah don't keer to hab ma feet
Get too blamed proud t' walk de street—
Huh-uh, not me.

So, Ah'll des wait till Gabr'el brings
Dem good ole-fashioned angel wings,
Den as Ah pass de ahplane by,
In pity, Ah'll look down and sigh—
Huh-uh, not me.

Missouri Freemason.

AERIAL AGE WEEKLY

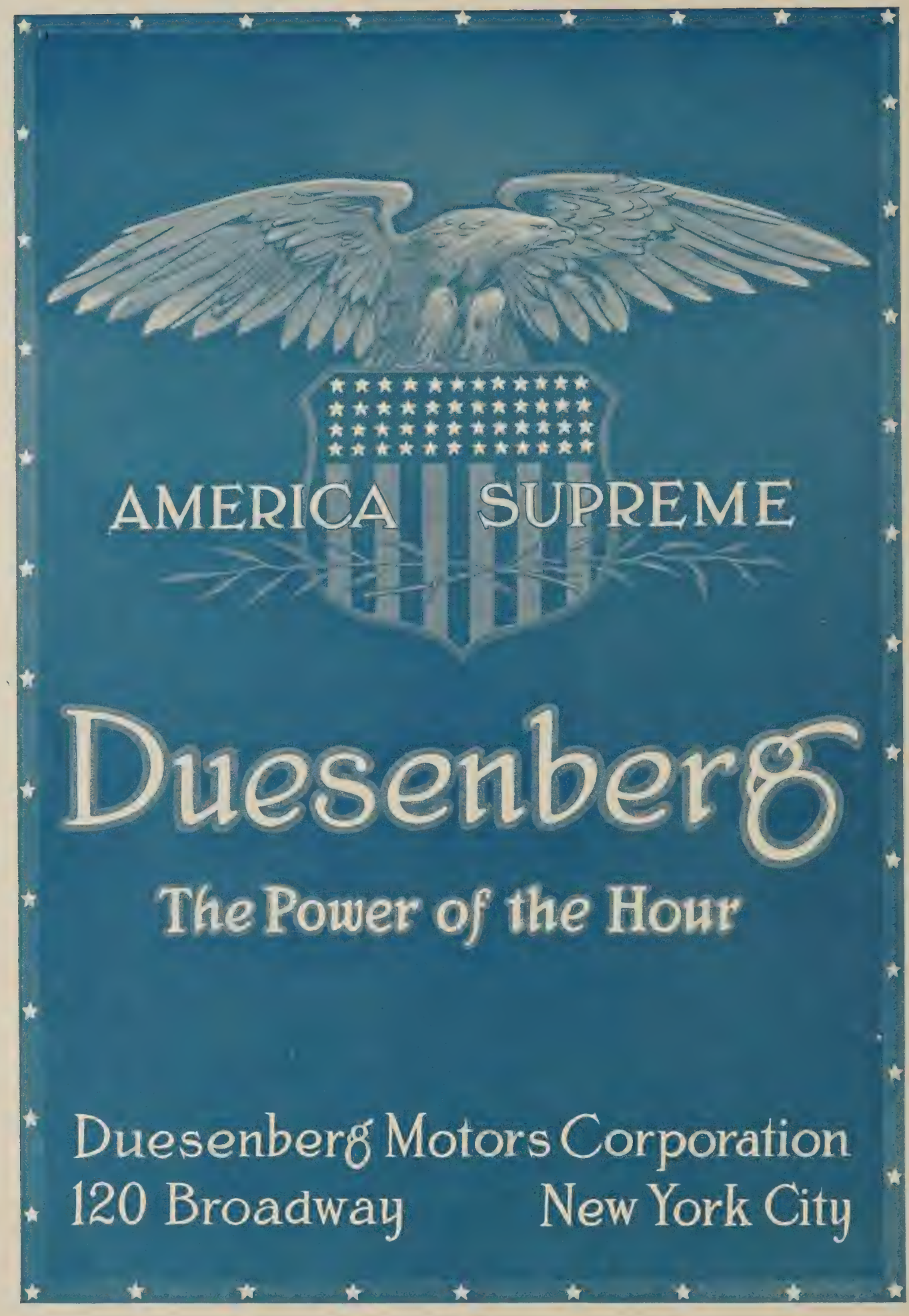
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A Thomas Morse S4C Single-Seater Scout Makes a Landing

First Air Port in World Established at Atlantic City

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VOL. IX NEW YORK, APRIL 14, 1919 No. 5

FIRST AIR PORT IN WORLD ESTABLISHED AT ATLANTIC CITY

WHAT is considered to be the most important step in popularizing aeronautics so as to insure the United States from again being unprepared in the event of an emergency was announced by Mr. Augustus Post, the secretary of the Aerial League of America.

Mr. Post announced that there is being established at Atlantic City the first "air port" ever established, the purposes of which are as follows:

(1) To establish the first air port in the world to be operated as seaports are operated, the aircraft starting from this port to be registered under the rules of the Aircraft Inspection Service of the Department of Commerce, having clearance papers just as the ships of the sea have.

(2) To supply a flying field for the Aero Club of America, the Aerial League of America and the Atlantic City Aero Club.

(3) To provide a municipal aviation field, an aerial mail station and aerial police station for Atlantic City.

(4) To supply an air port for trans-Atlantic liners, whether of the seaplane, land aeroplane or dirigible balloon type.

(5) To supply an aerodrome for land aircraft and a naval air station for seagoing aircraft, where those among the 10,000,000 people who visit Atlantic City each year, who wish to use aircraft as a means of conveyance, may put up their aircraft and have the necessary expert service and gasoline and hydrogen supplies, and may rent aircraft.

(6) To provide a service station or aerial garage for air travelers where they may house their aircraft temporarily or permanently, just as they house their automobiles at garages at present.

(7) To provide an air station at Atlantic City for the coming New York-Atlantic City passenger-carrying air lines which will cut the time required for travel between the two cities to fifty minutes, thereby enabling business men to commute between the two places.

(8) To establish a model air port which shall serve as a model for the other American cities to follow in establishing municipal or public air ports or aerodromes.

(9) To provide a station and facilities for instructing the chiefs of aerial police of different cities in the art of organizing and operating aerial police sections.

This work will be under the direction or supervision of Colonel Jefferson DeMont Thompson, the head of the Aviation Section of the New York Police Department, who, by appointment of Chief Commissioner Enright, and the cooperation of Special Commissioner Rodman Wanamaker and Commissioner Dyer, has established the first aerial police in the world.

(10) To provide a station and facilities for extensive research work in the medical side of flying. This work will be under the direct supervision of the Air Medical Committee of the Aero Club of America and Aerial League of America, of which Brigadier-General Theodore C. Lyster are chairman and vice-chairman respectively. Colonel Jones is now in Europe collecting all the available data regarding what has been done by other countries in this line. He will return to this country in time to participate in the Aeronautic Convention and Exposition at Atlantic City in May.

(11) To establish an extensive land and water aerodrome where intercollegiate seaplane, landplane and dirigible tournaments can be held, with hangar facilities for housing the college aircraft and a competent staff to take care of same.

(12) To supply a permanent civilian aviation field for demonstrating aeroplanes, dirigibles and kite balloons, as well as motors and accessories, where concerns can send their machines to be demonstrated to prospective purchasers or to make tests.

(13) To provide a suitable station for the study of meteorological conditions, the exploration of the upper air, the employment of aircraft for the Coast and Geodetic Survey, and other scientific purposes. Colonel E. Lester Jones, the Director of the Coast Geodetic Survey, has accepted the use of this station for the work of his important department.

(14) To provide an air station for the Coast Guard and Life Saving Service and other similar purposes.

(15) To set an example which, if followed by approximately 100 cities in the United States in the near future, will supply the aerial transportation which this country needs; will keep American aeronautics to the forefront; will give employment to a large number of American Army and Navy airmen, aeronautic engineers and mechanics who have been demobilized, will permit the utilization and salvage of war aeronautical material worth tens of millions of dollars; and will insure the United States from again being caught unprepared in the event of war.

The Atlantic City Air Port is the official aviation field of the Aero Club of America, the Aerial League of America and the Atlantic City Aero Club.

The joint committee of the three organizations in charge of the air port consists of the following gentlemen:

Rear-Admiral Robert E. Peary, Alan R. Hawley, Captain Robert A. Bartlett, Captain Granville A. Pollock (late of the Lafayette Escadrille), Augustus Post, Major Reed G. Landis, son of Judge Landis, the second greatest American Ace; Mr. Albert T. Bell, president of the Atlantic City Aero Club; Thomas F. Powers, John Hays Hammond, Jr., Charles Jerome Edwards, Colonel E. Lester Jones, Director of the U. S. Coast Geodetic Survey; Hon. Charles D. White, Brigadier-General T. C. Lyster, U. S. Air Medical Service (retired); Lieutenant Colonel I. H. Jones, U. S. A. M. S. (retired); Earl L. Ovington, Colonel Jefferson DeMont Thompson, Chief, Aviation Section, Police Department of New York City; Captain S. Herbert Mapes, Major Thomas S. Baldwin, Henry Woodhouse, Captain William Menkel, K. M. Turner, G. Douglas Wardrop, Lieutenant Edgar Henry Garland and Captain Charles J. Glidden, U. S. A.

The Atlantic City Air Port is located in the heart of Atlantic City and covers 160 acres of land with the riparian rights on what is known as the Thoroughfare, which also affords a fine location for hangars for seaplanes.

The field covers the entire section of Atlantic City which is known as Chelsea Heights and has a frontage of 3,200 feet on Albany Avenue, with a frontage of 2,500 feet on South Boulevard.

The entrance to the aviation field is only 2,000 feet from the Boardwalk and four minutes by automobile from the Atlantic City Railroad Station.

All the land on the aviation field is flat, cleared and ready for the aeroplanes which will land there during the Second Pan-American Aeronautic Exposition, which is to be held at Atlantic City beginning May 1st and continuing until May 31st.

AERIAL DERBY FOR PULITZER TROPHY AN ASSURED SUCCESS

MESSRS. RALPH PULITZER, Joseph Pulitzer, Jr., and Herbert Pulitzer, the owners of the New York World and St. Louis Post Despatch, have offered a trophy for annual competition to be open to U. S. Army, Navy and Marine Corps aviators, as well as all others who desire to compete. This trophy is a challenge trophy and is to be competed for annually, the event to be decided upon each year by the Aero Club of America, and must be won three times before it becomes the permanent possession of any competitor. The winner each year holds the trophy for the ensuing year—until permanently won.

The first competition for this trophy is to be known as the "Aerial Derby," and is to be held in connection with the one-month Aeronautic Convention and Exhibition at Atlantic City, beginning May 1 to May 31.

The Pulitzer Trophy this year is to go to the aviator who covers the longest distance in a non-stop flight in cross-country flying over land or over water, or both, in flying from any point to Atlantic City during the month of May or from Atlantic City to any given point.

There are no restrictions as to the type of aeroplane to be used or the amount of horsepower; the purpose of the competition being to demonstrate the great distances that can be covered by present-day aeroplanes, large and small. It is provided, therefore, that there shall be inscribed on the trophy the name or names of the aviator or aviators who cover the longest distance with aeroplanes equipped with one, two, three or four motors. The aviator or crew who covers the longest distance in non-stop flight, flying aeroplanes of any of the above-mentioned classes, will be designated as the winner or winners in their respective classes, and their names will be inscribed on the trophy.

To facilitate the organization of the "Aerial Derby" the Contest Committee of the Aero Club of America will accept entries without the formality of special entry blanks, provided the entries are made by letters or telegram, stating the type of aeroplane to be used and the horsepower.

To facilitate the race, the Contest Committee will also accept the written statement of the Commanding Officer of any Army, Navy or Marine Corps station, or a duly appointed observer, giving the time of departure of the aviator from his point of departure.

In case the aviator has to make a forced landing before reaching Atlantic City or his destination, he will request the local authorities to sign a statement giving the time and place and circumstances of landing to be forwarded to the Contest Committee of the Aero Club of America.

The aviators who come to Atlantic City on land machines can land on the new Atlantic City Aviation Field, which covers 160 acres and has two runways of 2,500 feet each. Water machines can land on the water landing place on the north side of the Aviation Field. The aeroplanes can then fly to the Cape May Station for the night, if preferred.

Henry Woodhouse, member of the Board of Governors of the Aero Club, Vice President of the Aerial League of America, sees in the Aerial Derby a valuable means for keeping alive interest in flying.

"Eighty per cent of the 30,000 Army and Navy aviators have just been demobilized," he said, "and unless something is done to induce them to take up aeronautics as a sport or business they will take up something else. If they do take up something else they are lost to aeronautics, because an aviator quickly gets out of practice and aeronautic progress goes on very fast.

"If there were no aerial activities for a year the United States would be so far behind other nations that we would never regain our present position in this wonderful new art and science. The offer of the Pulitzer Trophy is, therefore, a great help toward solving the problem which is facing American aeronautics."

"The results of the competition for the Pulitzer Trophy will amaze the country," declared Captain Granville A. Pollock, late of the Lafayette Escadrille, commander of the 1st Aero Squadron of the New York Police.

He said he spoke for twenty aviators who would like to enter for the Aerial Derby.

"The Army, Navy and Marine Corps have excellent aviators, and they and the civilian aviators can during the month of May give demonstrations of aeronautic possibilities undreamed of at present," he continued.

Flight between Chicago and Atlantic City will be common before the competition for the Pulitzer Trophy ends on May 31, in the opinion of Major Reed G. Landis, son of Judge Kenesaw Mountain Landis. Major Landis is America's second ace, having twelve enemy machines to his credit. His home is in Chicago, and he counts on the Derby of the air to develop distance flights until Chicago and the seaboard are in constant touch by the air routes.

Captain Pierre Bosc of the French Air Service, who wears the Croix de Guerre and the Italian War Medal, said he hoped he could remain in the United States long enough to enter for the trophy. Captain Bosc arrived in New York on Saturday on his first visit to America.

He declared that the institution of the Aerial Derby will prove an incentive to French as well as to American aeronautics. A French mission, he said, is on its way to this country and will be at Atlantic City during May to attend sessions of the Second Pan-American Aeronautic Convention and Exposition.

"Splendid for Aviation"

Colonel Charles Elliott Warren, Treasurer of the Aero Club and President of the Lincoln National Bank, was among those who expressed gratification at the offer of the trophy.

"It is a splendid thing for aviation," he said, "and Messrs. Ralph Pulitzer, Joseph Pulitzer, Jr., and Herbert Pulitzer deserve the thanks of the American aeronautic movement for their progressiveness and continued support of the art."

Mrs. William Allen Bartlett, Chairman of the National Treasure and Trinket Fund, who with others has been trying to save the services of the country's trained flyers for future work along that line, said:

"The Pulitzer Trophy will start a great many activities which we do not foresee at present and will supply employment for scores of aviators who are now idle. It is a great relief to us to know there will be aerial activities at Atlantic City in May. Already a dozen aviators have secured positions through the Aerial League of America in connection with the Atlantic City activities. Hundreds of aviators will be interested in the Pulitzer Trophy, from the standpoint of sport, and hundreds of others because it will demonstrate the practicability of aerial transportation."

Airmen Indorse Contest

In the long list of aviators who inquired about the contest and expressed enthusiasm regarding it were Captain Maurice G. Cleary, assistant to Colonel Archie Miller, commander of Hazelhurst Field; Captain S. Herbert Mapes, Lieutenant Samuel J. Mustain, who has just returned from France; Ensign Alfred E. Poor, U. S. N.; Ensign Charles H. Payne, U. S. N.; Lieutenant J. W. M. Richardson, Lieutenant Paul W. Ward, Lieuteuant Stuart Morgan and Captain William Menkel.

One point about which questions were asked was the condition regarding point of departure or arrival. The stipulations make it clear that contestants must either start from or finish at Atlantic City, and the Contest Committee of the Aero Club anticipates that most of the entrants will make their start there. It was pointed out, however, that an entrant may make as many flights as he pleases during the month the Pan-American Convention is in progress at Atlantic City, so that if he starts on a flight for that place and is compelled to stop en route he may continue and try again.

The fact that no limitations are placed on design or number of motors also appeared to cause some confusion. The trophy will be awarded for the longest non-stop flight by a plane of any class, and the names of the leaders in non-winning classes will be inscribed on it. Three years' consecutive winning carries permanent possession.

Approval was expressed of the wording of the conditions which leaves it possible that contests after this year may be for other performances than non-stop flights. With the rapid development of aviation it seems probable that a twelve-month hence flights will be limited only by the fuel carrying capacity of planes and their climbing or weight carrying ability then may offer contest points.

Rear Admiral Bradley A. Fiske, retired, in speaking of the offer of the Pulitzer Trophy, laid special stress on the aid such gifts offer Army and Navy aviation. Admiral Fiske is President of the Army and Navy Club and Vice President of the Aero Club of America. He said:

"Competition in the early days of the automobile industry, when many questioned whether motor-driven cars would ever prove of much practical value, served to demonstrate what they actually could do and helped materially to raise automobile building into one of the greatest businesses in this country.

"At the present state of flying competition is of the greatest service, and the generosity of Messrs. Ralph Pulitzer, Joseph Pulitzer, Jr., and Herbert Pulitzer will prove of the greatest value at the present moment."

Entry blanks for the Pulitzer Trophy are being drawn and will be ready this week. It is the desire of the Contest Committee of the Aero Club to have the conditions as liberal as is consistent with fairness, in keeping with the terms of the deed of gift.



THE NEWS OF THE WEEK



Captain Pollock Elected Major of New York Police Squadron

New York, N. Y.—Equipped with wireless telephone, armed with machine guns and driven by aviators in uniforms of a distinctive pattern, the twenty aeroplanes of the aviation branch of the New York Police Reserves will soon be doing regular duty in the air about the city under Captain Granville A. Pollock, who was elected major in charge of the flying squadron at a special meeting in Police Headquarters on April 2.

The first work of the aviation branch will be the photographic mapping from the air of the entire city of New York.

Already, it was said, several progressive Western cities, following New York's lead, have laid out landing fields in preparation for municipal aeroplane service.

At the close of the meeting the following statement was issued:

"The aviation branch probably will be divided into two large sections—a number of pursuit scouts and a larger number of aerodrome police.

"With an aeroplane service like this catastrophes like the Minnesota fire, which destroyed entire communities and caused losses amounting to millions of dollars, or the Dayton and San Diego floods, could be isolated quickly, thus saving lives and property.

"Equipped with a Culver wireless telephone, such as is used by the United States Navy to direct aerial operations, the police aviator can receive orders direct from the office of the chief of the aviation section of the Police Department and report directly to him as to conditions at any port within a radius of from ten to fifty miles, which he can survey from a height of two thousand feet. Having received radio telephone orders from the aviation chief, the aerial policeman can in turn transmit the orders to captains of ships and can carry out the orders at lightning speed.

"The chief duty of the pursuit scouts will be in the heading off of negligent aviators from prohibited areas. Inasmuch as even an orange or other small object dropped from an aeroplane through the roof of a powder mill is considered by experts to be sufficient to cause an explosion, regulations in this respect are likely to be very drastic.

"The scouts in all probability will be armed with machine guns, from which tracer bullets will be fired as a warning or to shoot down air pirates, as no other means of dealing with lawbreakers in the air at present suggests itself.

"Deputy Police Commissioner Rodman Wanamaker, who is responsible for the forming of the aviation branch of the Police Reserves, has long been interested in aviation. Not only did he purchase and bring over a Bleriot monoplane back in 1909, but he also acquired one of the first balloons purchased in the United States, besides organizing and backing a trans-Atlantic flight in 1914, which project was only sidetracked because of the war.



Miss Marion Cassidy, the first Canadian woman to fly, will pilot plane to Atlantic City Convention

"Aviators' Good Landing Club" to Open New York Clubhouse May 1st

New York, N. Y.—The Aviation Committee of the National Special Aid Society, Inc., is opening a club house for our aviators to be known as the "Aviators' Good Landing Club" the first of May at 114 East Thirty-ninth Street, New York. It is at the request of the fliers that this club is opening, and it will fill a long-felt want, they assure the committee. The club will include an aeronautical library, rest room, writing room and informal grill. Mrs. William Allen Bartlett, chairman Treasure and Trinket Fund. This fund has raised and spent $100,000 on Uncle Sam's aviators with the hearty approval of the War Department and the National Investigation Bureau, and the gratitude of the fliers. Initiation fee, $1, and dues, $1; hours between 8 A. M. and 12 P. M.

Miss Marion Cassidy, First Canadian Aviatrix, Has War Service Record

Miss Marion Cassidy, the eighteen-year-old Canadian aviatrix, is now in New York after serving as chauffeur for Brigadier-General Gurney Hoare, Commander in chief of the Royal Air Force in Canada. Miss Cassidy took a thorough course in aeronautics under Major Herbert Fisher, Chief Instructor of the Royal Air Force and has flown with Miss Ruth Law and General Hoare. She has had twenty-five hours of solo work at Borden, Ontario and twenty hours at the Long Island Aviation School, Central Park, L. I.

Miss Cassidy is an Honorary Member of the Canadian Aero Club, which has a membership of 3,000, and is the only member of her sex.

Early in May, Miss Cassidy will fly to the Atlantic City Aeronautic Convention from New York City.

Planes Greet Admiral Sims

New York, N. Y., April 7.—An air escort of eight seaplanes and one dirigible participated in the hearty welcome extended to Admiral Sims on his arrival on April 7 aboard the Mauretania.



Curtiss Type R Mail Plane, which successfully delivered mail from Philadelphia on March 28, during the worst gale recorded by the Weather Bureau in many years

Aircraft Board Abolished by Presidential Executive Order

President Wilson has issued an executive order under date of March 19 abolishing the Aircraft Board and placing all aircraft production, as well as aircraft funds, under the control of Major General Menoher, the newly appointed Director of the Army Air Service. The order was necessary, General March explained, to keep the record straight and no change in system was involved.

General March's statement follows:

I have been asked something about the Executive Order which was released on April 5 concerning the Director of Aircraft Production. It was necessary to issue this order because the original order establishing the Air Service specifically put Mr. John D. Ryan as the man who could perform certain functions, and as the head of the Aircraft Board he had other functions to perform; and this order simply gives General Menoher the same status with regard to these matters that Mr. Ryan had. There is no change in the actual system that is going on.

Executive Order

By virtue of the authority in me vested as Commander-in-Chief of the Army, and by virtue of further authority upon me specifically conferred by "An Act authorizing the President to co-ordinate or consolidate executive bureaus, agencies and offices, and for other purposes, in the interest of economy and the more efficient concentration of the Government," approved May 20, 1918, I do hereby make and publish the following order:

I.

The Aircraft Board, created by Act of Congress, approved October 1, 1917, having accomplished the important purposes for which it was created, is hereby dissolved.

The last paragraph of Section 3, Article I, of the Executive Order of May 20, 1918, is hereby revoked and the following paragraph substituted therefor:

"A Director of Aircraft Production, selected and designated by the Secretary of War, shall hereafter have direct charge, under the direction of the Director of Air Service, of the Bureau of Aircraft Production, and he shall perform such duties in connection with the activities, personnel and properties of said Bureau as may, from time to time, be assigned him by the said Director of Air Service, or as may be prescribed by law."

II.

All unexpended funds of appropriations heretofore made for the Signal Corps of the Army and already specifically allotted for use in connection with the functions of the Aviation Section of the Signal Corps and specifically placed under the jurisdiction of the Director of Military Aeronautics, as well as all such funds already specifically allotted for use in connection with the functions bestowed upon the Bureau of Aircraft Production and specifically placed under the jurisdiction of the Director of Aircraft Production are hereby transferred to and placed under the jurisdiction of the Director of Air Service for the purpose of meeting the obligations and expenditures authorized by law or Executive Order in the field of activity of the Aviation Section of the Signal Corps and the obligations and expenditures authorized by the Bureau of Aircraft Production.

Woodrow Wilson.

Coincidental with the announcement of the order, the War Department disclosed the status of Air Service appropriations. The total appropriations for the Air Service since the beginning of the war, after deducting $487,000,000 carried to the surplus fund and covered into the Treasury, amounted to $1,097,304,758. Of this amount $712,000,000, or about 65 per cent., had been spent up to March 18, 1918. The estimated outstanding obligations are $200,000,000, and the estimated balance is $187,000,000, or 17 per cent. of the total. The figure of $200,000,000 given as representing estimated outstanding obligations is based, it was explained, on the assumption that approximately $340,000,000 would be saved in the liquidation of suspended contracts.

Announcement was made that current air service appropriations authorized by the act of February 25, 1919, had been reduced $485,000,000. This act carried $944,304,758, of which $760,000,000 was allotted to the Bureau of Aircraft Production, and $184,304,758 to the Division of Military Aeronautics. Up to February 25, 1919, the appropriation for the former had been reduced $360,000,000. This was a 53 per cent. reduction. The appropriation for the Division of Military Aeronautics was reduced $85,000,000.

Announcement was made that the Packard Motor Car Company made the final deliveries of Liberty-12 motors during the week which ended March 21, and that this completed all contracts for Liberty motors. The number of Liberty-12 motors completed was 20,478, as follows: Packard Motor Car Company, 6,500 motors, 32 per cent. of total; Lincoln Motor Company, 6,500 motors, 32 per cent.; Ford Motor Company, 3,950 motors, 19 per cent.; General Motor Company, 2,528 motors, 12 per cent.; Nordyke-Marmon Company, 1,000 motors, 5 per cent.

The value of the cancellations and suspensions of Army Air Service contracts up to March 22, 1919, was $493,342,379, distributed as follows: Engines and spare parts, $266,961,771; aeroplanes and spare parts, $165,288,590; chemicals and chemical plants, $18,648,239; instruments and accessories, $10,761,081; balloons and supplies, $10,071,035; fabrics, lumber and metals, $7,977,445; miscellaneous, $13,634,218.

Although the demobilization of the Army Air Service will continue until the enlisted personnel is reduced to 15,000, twenty-one aero squadrons will be retained in the service, as follows:

Pursuit squadrons, 27th, 94th, 95th and 147th.

Bombardment squadrons (day), 11th, 20th, 96th and 166th.

Army observation squadrons, 9th, 24th and 91st.

Army artillery squadrons, 99th, 135th and 258th.

Corps observation squadrons, 1st, 12th, 50th and 88th.

Surveillance squadrons, 8th, 90th and 104th.

Colonel E. Lester Jones Wins Italian Decoration

Washington, D. C.—Word has just reached this country that King Victor Emmanuel of Italy has made Colonel E. Lester Jones, director of the United States Coast and Geodetic Survey, an officer of the Order of the Saints Maurizio and Lazzaro, First Class, for distinguished civil and military service. The decoration is the oldest given by the kingdom of Italy, established in 1434, and rarely conferred on a foreigner.

Colonel Jones has just retired from the air service, having returned a month ago from overseas.

Carrier Pigeon Brings Relief

Atlantic City, N. J., April 6.—As a result of the arrival late on April 5 of a carrier pigeon, which flew into a room on the eighth floor of the Hotel Marlborough-Blenheim, Ensign Finch of the Naval Air Service was safely back at his base at Cape May instead of a captive in a disabled hydroaeroplane drifting helplessly off the coast in the grip of the Gulf current.

Exhaustion of the gasoline supply caused Ensign Finch to come down. The heavy seas caused the seaplane to ship a good deal of water and the assistance which the pigeon brought was urgently needed.

Radio Telephones Used by Army as Beacons for Aeroplane

Washington, April 6.—Experts of the Army Signal Corps, it was learned recently, have begun experiments with a recent invention, described as an "audible beacon," which they believe will prove valuable in making the aeroplane a commercial utility. The new contrivance is designed as a signal which will advise the aviator not only of his own position regardless of weather conditions, but will provide accurate marks for suitable landing places.

"The beacon" is said to be a combination of the new wireless telephone and the ordinary phonograph. Its operation will be more or less automatic and will repeat a word or signal designating its position. For instance, one at Langley Field, the inter-departmental aviation base, might send out the call "Langley" at stated intervals.

Officials working on the invention be-



An easy method of transporting a large aeroplane. A 3-engined Caproni biplane carried by a Ford. Temporary braces are placed between the landing gears and fuselage, in the absence of flying rigging

lieve that the next step will be the adoption of the sound-ranging device, now used by armies in connection with artillery fire, to enable aviators to determine without delay the distance and direction of the call of any one of these sending stations.

International Aeronautic Conference Personnel Officially Announced

Washington, D. C., April 7.—The State Department announced that the International Air Conference now in session in Paris is officially designated as the Inter-Allied Aeronautical Commission of the Peace Conference. The president of the commission is Colonel Pauldhe, the Director of French Military Aeronautics. The commission is charged with the consideration of any aviation questions which may be requested by the Peace Conference, and to draft a convention relative to international air navigation during peace. The commission has appointed sub-committees on technical matters, on commercial, legal and financial matters, and on military operations. The sub-committees are in continuous session.

The following are the official delegates:

United States—Rear Admiral H. S. Knapp, U. S. N.; Major General M. T. Patrick, U. S. A.

Great Britain—Major General J. Seely, Royal Air Force; Major General Sir S. H. Sykes, Royal Air Force.

France—Colonel Pauldhe, French Military Aeronautics; Capitaine de Vaisseau Chauvin, French Naval Aeronautics.

Italy—Mr. S. E. Chiesa, Italian Parliamentary Deputy for Aviation; General Moris, Italian Military Aeronautics.

Japan—Major General K. Tanaka, Imperial Japanese Army; Mr. Kamakawa.

Belgium—Colonel de Crombrugghe.

Brazil—Capitaine de Fregate, Armando Burlamqui, Brazilian Navy.

Cuba—Mr. De Boustamente.

Greece—Colonel A. Mazarakis.

Portugal—Colonel J. M. R. Norton de Mattos.

Roumania — Colonel D'Etat Major, Thomas Dimitresco.

Serbia—Chef d'Escadron, Mirko Marinkovitch.

THE TRANS-ATLANTIC FLIGHT

PREPARATIONS for the trans-Atlantic flight continued during the past week with unabated vigor. It is now the general opinion that the weather will be the most important factor in determining what date the start is to be made.

British and American Destroyers to Co-operate

British destroyers will co-operate with the American Navy in patrolling the course to be followed by American naval seaplanes in the projected flight across the Atlantic. It was learned at the Navy Department that from forty to fifty British ships would be on duty from the Azores to the British Isles, where, under present plans, the flight will end.

American destroyers will patrol the course from St. John's, N. F., to the Azores. From fifty to sixty of the craft will be used, and they will be stationed at intervals of less than 200 miles.

Along the greater part of the course there will be an almost continuous stream of army transports going to and returning from France, and these vessels will form additional safeguards for the crews of the planes in event accidents force any of them to descend.

Franklin D. Roosevelt, Acting Secretary of the Navy, who realizes that public interest in the coming trans-Atlantic flight must be considered, made it known that the press associations probably would be permitted to have representatives aboard the American destroyer Melville, which will act as fuel ship for the seaplane. The Navy Department will have the Melville stationed at some point in the Atlantic where the plane may come down for fuel if this is required, and if the press associations desire to have representatives aboard and take their chances of getting news en route from the flight Mr. Roosevelt will make the necessary arrangements.

Navy Planes Being Tuned Up

The N-C-2, one of the four giant naval flying boats which will attempt the trans-Atlantic flight, was given a short preliminary test flight recently. After a short run on the waters of Jamaica Bay the ship took the air gracefully. The plane circled around for five minutes before descending and then was taken back to her moorings.

Four motors will be carried by the N-C-4, now being completed at Garden City, L. I., and most officers favor the use of this number on the flight, both because of the increased power and because the planes could be better managed in the event one motor went out of commission during the volage.

These four motors are fitted in pairs and develop 1,600 horsepower.

The United States Army plan for a trans-Atlantic flight, using a Glenn L. Martin bomber, to be undertaken by Captain Roy N. Francis, is still under veil of secrecy. No details of the preparations have been made public.

Captain B. B. Lipsner, former chief of the aerial mail service, announced his intention of attempting the flight in a special machine built by Captain James V. Martin. Captain Lipsner will make the attempt over the Azores route, along practically the same course as the transport George Washington took to France.

British Airmen Waiting for Good Weather

Harry A. Hawker has established an aerodrome at Glendenning Farm at Mount Pearl, four miles west of St. John's, Newfoundland. Five mechanics are assembling his 375-horsepower Sopwith biplane. Hawker is quoted by newspaper correspondents as stating that he did not believe that the start could be made within two weeks, owing to the unfavorable weather conditions.

The R-34, sister ship of the R-33, received a trial flight at Mehinnan, Scotland, last week. The R-34 has a hydrogen capacity of 2,000,000 cubic feet, is about 700 feet long, 80 feet in diameter, and 95 feet high. It will lift 65 tons, including its own weight, carries a crew of 30 men, and travels at about 70 miles an hour. The R-34 is equipped with five Rolls-Royce Eagle engines, giving an aggregate of approximately 2,000 horsepower.

Another British entry is a huge triplane flying boat designed by Lieutenant Colonel John C. Porte for the British Air Ministry. No details regarding it are available. A supertriplane built for Captain

(*Continued on page 262*)



Group of aviation officers just prior to their being decorated with the D. S. C. by Lieutenant General Hunter Liggett. Left to right, Capt. J. Dickerson Estee, Capt. "Eddie" Rickenbacker, Capt. Sollers, Lt. Hugh Brewster, Lt. C. R. Olive, Lt. Bradley J. Gaylord, Lt. James Knowles, Jr., Lt. Howard G. Rath, Lt. L. C. Somon. Rembercourt, Meurthe and Moselle, France, Nov. 10, 1918

The AIRCRAFT TRADE REVIEW

Essington School in Philadelphia for Water Flyers Will Open Soon

Essington, Pa.—Frank Mills, well-known Curtiss flier, who has had over 2,000 hours in the air and who was a senior flying instructor for the Air Service during the war, will soon open a flying school for seaplane pilots near Philadelphia.

The site of the Essington School was formerly used by Mr. Robert Glendenning, the Philadelphia banker, as the first water flying school in Pennsylvania. All the Army runaways and material for hangars has been purchased by Mr. Mills and a plane is already in operation.

The price of a course at the Essington School will be $400.

Cantilever Aero Company to Build Trans-Atlantic Aeroplanes

Announcement has been made by Dr. William Whitney Christmas, president of the Cantilever Aero Company, that his organization will immediately commence building two aeroplanes for trans-oceanic flights. The Cantilever Aero Company has been building the strutless and flexible wing aeroplane known as the "Bullet" which is credited with a speed of 200 miles an hour.

In his new design Dr. Christmas plans to build aeroplanes of the biplane type having the following specifications:

Span of upper wings	180 ft.
Span of lower wings	90 ft.
Chord of upper wing	24 ft.
Chord of lower wing	12 ft.
Total lifting surface	5,000 sq. ft.
Lifting capacity	57,000 lbs.
Number of motors	4
R. P. M. motors	600
Overall height	24 ft.
Propellers	3 bladed, 21 ft. diameter

Dr. Christmas, in commenting on the special feature of design, said:

"After six years in carefully considering every detail of the trans-Atlantic aeroplane I believe our company has developed a type of machine suitable for the successful passage across the Atlantic.

"This aeroplane has a wing spread of 180 feet, with a surface area of 5,000 square feet. The motive power of the machine consists of four motors of 800 horsepower each, which, while they are a collective unit, can also be run independently. This allows adjustments or temporary repairs. While the 3,200 horsepower thus obtained by the four motors is more than the amount needed, it can be split up into such units of power that there will be no danger on account of engine trouble. This aeroplane is of the biplane type, but has characteristics which are essentially different from the most common variety of biplane. The span of the upper wing is 180 feet and its chord is 24 feet. The span of the lower wing is 90 feet, and its chord 12 feet. This gives the best characteristics of both monoplane and biplane types.

"It is well known that the monoplane has much higher efficiency per square foot of surface than the biplane, and for this reason we determined to make the upper wing so large that it has all the lifting capacity of the monoplane. By such construction we are able to build a machine which is not overhigh, and although a machine of this size would ordinarily demand excessive height our design permits a total overall height of only 24 feet.

"The machinery and all the driving mechanism is contained within the fuselage where it can be under the eye of the engineer in charge. The motors are connected by an electro magnetic clutch, also the transmission gear. Extending out on each side of the fuselage are brackets, at the end of which are the propellers—one on each bracket. These propellers are 21 feet in diameter, three-bladed, and revolve at 600 R. P. M. The power from the motors is transmitted to the propellers through a shaft gearing, which is encased in a tube lined with ball bearings.

"The controls are partly mechanical, operated by electric motors. The power for these controls is supplied by a gasoline-electric generating plant from the four motors used for propulsion. This generating plant also supplies electricity for heat and light.

"The new Cantilever type will be controlled by a captain who is an experienced navigator and who is in charge of the pilot and engineer. The captain communicates his commands by telephone.

"The lifting capacity of this trans-Atlantic flyer is 57,000 pounds, which includes dead weight of ship and supplies as well as passengers. Thus the ship will be able to carry a large amount of fuel for passage. This fuel can be greatly conserved by utilizing only half the motive power after sufficient altitude is obtained. This ship has a high gliding characteristic.

"Many advocate crossing the ocean in a series of more or less comparatively short flights, starting, say, from Newfoundland. While the trans-Atlantic flights may be accomplished in this manner at an early date, it is not believed that such a route will be a commercial success. It is doubtful if the public would look kindly on such a routing, which is circuitous and interrupted. The Cantilever Aero Company plans to send its aeroplanes direct from New York or Philadelphia.

Time Limit for Turning in Claims for War Contracts

Washington, D. C., April 5.—Mr. Crowell, Assitsant Secretary of War, gave notice to-day that contractors desiring to adjust cancelled war contracts through the machinery set up by the War Department for that purpose must present their claims prior to May 15.

In a letter to Mr. Glass, Secretary of the Treasury, Mr. Crowell said nearly one-half the claims involved had not been formally presented, and that this is greatly handicapping the organization which is handling this work.

Orders for Liberty 12 Engines Completed

The Packard Motor Car Company made the final deliveries of Liberty 12 motors during the week ended March 21, 1919. This completes all contracts. The following shows the number and per cent. produced by each factory:

Firm	Number produced	P. C. of total
Packard Motor Car Co..	6,500	32
Lincoln Motor Co.....	6,500	32
Ford Motor Co.....	3,950	19
General Motor Co.....	2,528	12
Nordyke-Marmon Co...	1,000	5
Total	20,478	

American Bosch Magneto Staff Growing

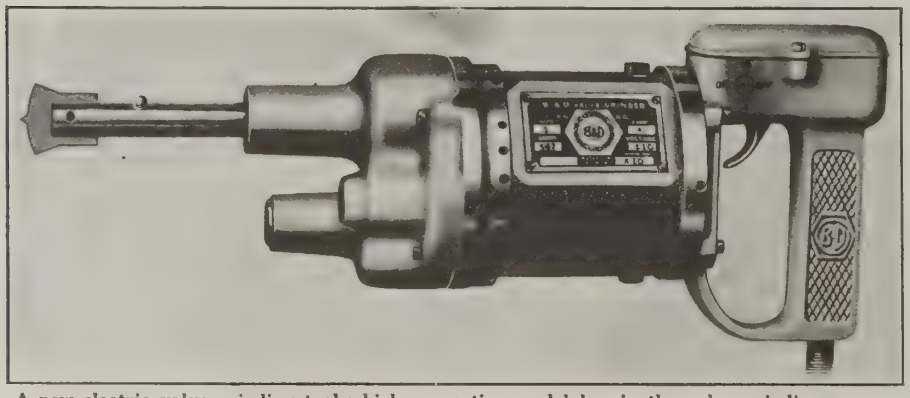
Mr. W. G. Brown has been transferred from the New York branch to Chicago, where he will have charge of that territory, acting as branch manager.

Mr. T. C. Miller, formerly assistant branch manager at Detroit, has been appointed branch manager at New York.

Mr. Harold A. Wilson, formerly of the Diamond State Fibre Company, has joined our forces as assistant branch manager at Chicago.

Mr. A. C. Hyser, formerly in charge of service of the Willard Storage Battery Company, goes to Detroit as assistant branch manager of the Detroit branch.

Mr. Oliver S. Stanley, formerly assistant manager of the St. George Paper Company, Norwalk, Conn., has joined our forces as assistant manager of the New York branch.



A new electric valve grinding tool which saves time and labor in the valve grinding process manufactured by the Black & Decker Mfg. Co. of Baltimore

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service

Louis T. Bussler, Chief of Maintenance and Equipment
J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service



PILOTS

Ira O. Biffle
Dana C. DeHart
Edward V. Gardner
Lawton V. Smith
Leon D. Smith
Robert F. Shank
Irving Graeb

John A. Jordan, Superintendent, Western Division
Trent C. Fry, Manager, Belmont Park, L. I.
Charles I. Stanton, Manager, College Park, Md.
John M. Miller, Manager, Bustleton, Pa.
O. J. Sproul, Manager, Chicago, Ill.
C. E. McMillan, Manager, Cleveland, Ohio
August Carlson, Manager, Lehighton, Pa.
Harry F. Powers, Manager, Bellefonte, Pa.
William Lindley, Manager, Clarion, Pa.
J. P. Edwards, Manager, Bryan, Ohio
Charles N. Kight, Special Representative

RESERVE PILOTS

Lester F. Bishop
Dan Davison
C. C. Eversole
E. A. Johnson
D. I. Lamb
Frank McCusker
E. H. Lee
Lyman Doty

CHIEF MECHANICS

Frank Tower
Edward C. Radel
Chas. C. King
H. E. Fremming
Albert Cryder

Specifications for Multi-Motored Planes Issued by P. O. Department

The Post Office Department has issued specifications for multi-motored aeroplanes of strictly commercial type and particularly adapted for the carrying of mails. The specifications are general in their terms and are designed to allow aeroplane builders the widest latitude of design and construction to give the performance required for carrying the mails. They are the result of a symposium of views of pilots, aeroplane mechanics, aeronautical engineers and practical aeroplane builders on what should be the qualifications of a practical commercial plane. Consideration will be given to a plane of two, three or more motors connected on one shaft or set in the wings or central fuselage, or both, and carrying a minimum of 1,500 pounds of mail. While the needs of the Department are preferably for a plane carrying a ton or 1½ tons of mail, consideration will be given to a machine of 1,500 pounds mail carrying capacity.

What the Department especially desires is an aeroplane of the lowest possible landing speed, whether that speed is structurally inherent in the machine or accomplished through mechanical devices, and a cruising speed of between 90 and 100 miles an hour, with a top speed of between 110 and 115 miles and a cruising radius of about six hours with normal load. A serviceable ceiling of at least 15,000 feet is wanted. If the planes are built around Liberty or Hispano-Suiza engines the Department will furnish the motors.

According to the views of postal officials, a plane with a mail carrying capacity of 1½ tons, with a six-hour cruising radius, should not exceed 100 feet in the wing span. Engines if placed in the wing must be made accessible with safety to the mechanic for minor repairs in the air. Each engine is to be equipped with independent and, as far as possible, dual gas, oil and ignition systems to minimize engine failure.

The bids are to be opened on June 2 and it is expected that planes will be ready for delivery within six months after letting the contract.

Frankfort-Berlin Aerial Mail in Operation

A daily aerial mail service is in operation between Frankfort-on-Main and Berlin. Registered mail is carried, and the trip takes four hours.

Heavy Gale Does Not Halt Aero Mail

Washington, D. C., March 29.—Despite the furious gale which raged east of the Mississippi, John N. Miller, Post Office pilot, made a successful trip from Philadelphia to New York. Owing to the heavy and blinding snow, Miller was unable to discern the flares which were lit in order that he might find the landing field, but he estimated after two hours of flying that he had arrived at Belmont Park. On landing he found himself eight miles off his course.

Pilot Mike Eversole, who was detailed to carry mail from Philadelphia to Washington, came off next best. He was the only pilot other than Miller who got more than fifty or sixty feet from the ground. For three hours he battled with the heavy gale and was then forced to descend because his gasoline gave out. The landing was made at Newcastle, Del. He had gone approximately fifty miles, thus averaging 16 2-5 miles an hour.

UNITED STATES POST OFFICE AIR MAIL SERVICE

Monthly Report of Operation and Maintenance

FEBRUARY, 1919

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone, and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND UNIT COST					
													Gallon of Gasoline	Total Time Run		Total Miles Run	Miles Run Per Gallon of Gasoline	Cost per Hour	Cost per Mile
														hr.	min.				
2	$77.94	$30.15	$58.82	$61.66	$46.47	$129.61	$218.31	$244.48	$27.60	$60.43	$65.07	$1,020.54	256	17	44	1384	5.41	$57.60	$.7374
3	34.93	17.96	58.82	61.66	46.47	129.61	91.37	184.10	34.60	60.43	65.07	785.02	115	6	48	526	4.57	115.20	1.4924
4	52.66	17.09	58.81	61.66	46.47	129.61	120.19	319.13	105.80	60.43	65.07	1,036.92	161	13	01	918	5.70	79.80	1.1295
7	41.28	9.04	58.81	61.66	45.47	129.61	37.69	225.23	56.50	60.43	65.07	791.79	135	3	26	233	1.73	230.40	3.3982
8	63.95	11.54	58.81	61.66	46.47	129.61	136.03	176.21	65.30	60.43	65.07	875.08	210	8	17	362	1.72	105.60	2.4173
38262	17.29	.81	41.51	61.66	19.22	129.61	13.05	226.77	15.05	60.43	65.07	650.47	45	0	53	90	2.00	736.20	7.2274
38274	30.43	8.38	41.51	61.66	19.22	129.61	11.74	226.77	16.05	60.43	65.07	670.87	88	5	52	268	3.05	114.60	2.5032
38275	42.94	14.65	58.81	61.66	46.47	129.61	43.20	319.51	59.60	60.43	65.07	901.95	129	4	41	427	3.31	192.60	2.1123
38278	90.64	27.42	58.81	61.66	46.47	129.61	261.44	368.74	27.95	60.43	65.07	1,198.24	287	28	03	2172	7.57	42.60	.5517
38279	93.90	30.39	58.81	61.66	46.47	129.62	257.26	318.46	42.26	60.43	65.07	1,164.33	287	19	18	1323	4.61	60.60	.8801
38280	41.31	2.04	58.81	61.66	46.47	129.62	44.30	266.18	111.20	60.44	65.07	887.10	124	4	47	346	2.79	185.40	2.5639
39362	96.45	27.14	58.81	61.66	46.47	129.62	133.18	186.46	154.50	60.44	65.07	1,019.80	316	11	14	889	2.84	90.60	1.1344
39363	196.69	58.70	58.81	61.66	46.47	129.62	289.60	401.24	45.75	60.44	65.07	1,414.05	568	18	20	1526	2.69	77.40	.9266
39364	.....	.....	17.30	61.67	27.25	129.62	.....	83.86	.....	60.44	65.08	445.22	.....	.....		.....	.....	.....	.....
39365	96.21	3.41	29.20	61.67	36.19	129.62	142.64	159.32	.....	60.44	65.08	783.78	214	8	51	508	2.37	88.80	1.5429
Total....	$976.62	$258.72	$776.45	$924.92	$613.05	$1,944.21	$1,800.00	$3,706.46	$762.16	$906.50	$976.07	$13,645.16	2935	151	15	10982	3.74	90.22	1.2425

Cost per mile, overhead, $.3822; cost per mile, flying, $.2764; cost per mile, maintenance, $.5839.

NOTE—Slight increase in cost per hour and cost per mile over January due to short month—24 operating days—and to one plane receiving general overhauling, and one rebuilt.

OTTO PRAEGER, Second Assistant Postmaster General.

THE CAPRONI TRIPLANE

CAPRONI Triplanes have become world famous, and it is interesting to follow the trend of their development, and to notice the many variations in detail that may occur in a single design. This is well illustrated in the accompanying outline drawing, the photograph below, and the complete description of the Caproni Triplane published in the March 17th issue of AERIAL AGE. Various engines have been used in the big triplane. The 8-cylinder Issotta-Fraschini 250 H.P.; the S. P. A., and 6-cylinder Fiat being the most common. Recently the Navy type low compression type Liberty Motors have been used with success.

The outline drawing shows an arrangement whereby the radiator for the central engine is located at the front of the nacelle and radiators for the fuselage engines placed at the fuselage nose. With some of the engines, three vertical radiators were used, located above the engines and braced to the interplane struts.

The Type C A-4 is an improvement upon the older triplane, of a similar type, which had a third group of landing wheels in front of the nacelle. Machines with this extra landing gear were used principally for training purposes.

The usual crew is composed of two pilots seated side by side, a gunner in the forward cockpit and two gunners placed in compartments in each fuselage, just aft of the main planes. It is possible for the crew to change places with one another while the machine is in flight.

The general specifications of the type C A-4 1915 Triplane are as follows:

Span (all planes)	96′-6″
Length over all	42′-11″
Height over all	20′-8″
Chord	7′-0″
Gap between planes	8′-0″
Total area	2,223 sq. ft.
Engines (3) Liberty, each	350 H.P.
Weight empty	11,100 lbs.
Weight fully loaded	17,700 lbs.
Bomb capacity	3,000 lbs.
Speed at 6,500 feet (Liberty Engines)	98 M.P.H.
Climb to 6,500 feet	14 minutes
Ceiling	16,000 feet

Main planes are composed of 21 sections; middle sections 5′-6″ in span; inner and outer intermediate sections, 13′-1″; and outer sections, 18′-3″. All planes have a chord of 7′-0″. Gap between planes, about 8′-0″. Gap to chord ratio, 1.004.

Tail control surfaces are built up of steel tubing. Rudders are balanced, braced by faired steel tubes and interconnected with piano wires. The elevator is one continuous surface 36′-4″ long and 1′-7″ wide. Horizontal stabilizer 34′-1″ long and 3′-1″ wide. There is no vertical fin.

Fuel is carried in tanks near each of the engines, with a separate wind vane, centrifugal pump for each. Two small gravity tanks are provided for running the engines preparatory to flight. An oil tank and oil radiator are provided for each engine.

The landing gear units are especially robust on account of the machine's great weight. The two M-struts are of laminated ash and spruce, wrapped with canvas fabric. The chassis carries on each side one front and one rear axle; these axles are attached to the chassis by means of shock absorber rubber cord and radius rods fastened at the other end in a universal joint, so as to absorb whatever oscillation the machine may make in taxing or landing. Each of the front axles carries two double wheels, one on each side of the M-strut. The chassis is braced in the usual manner with double steel cables.

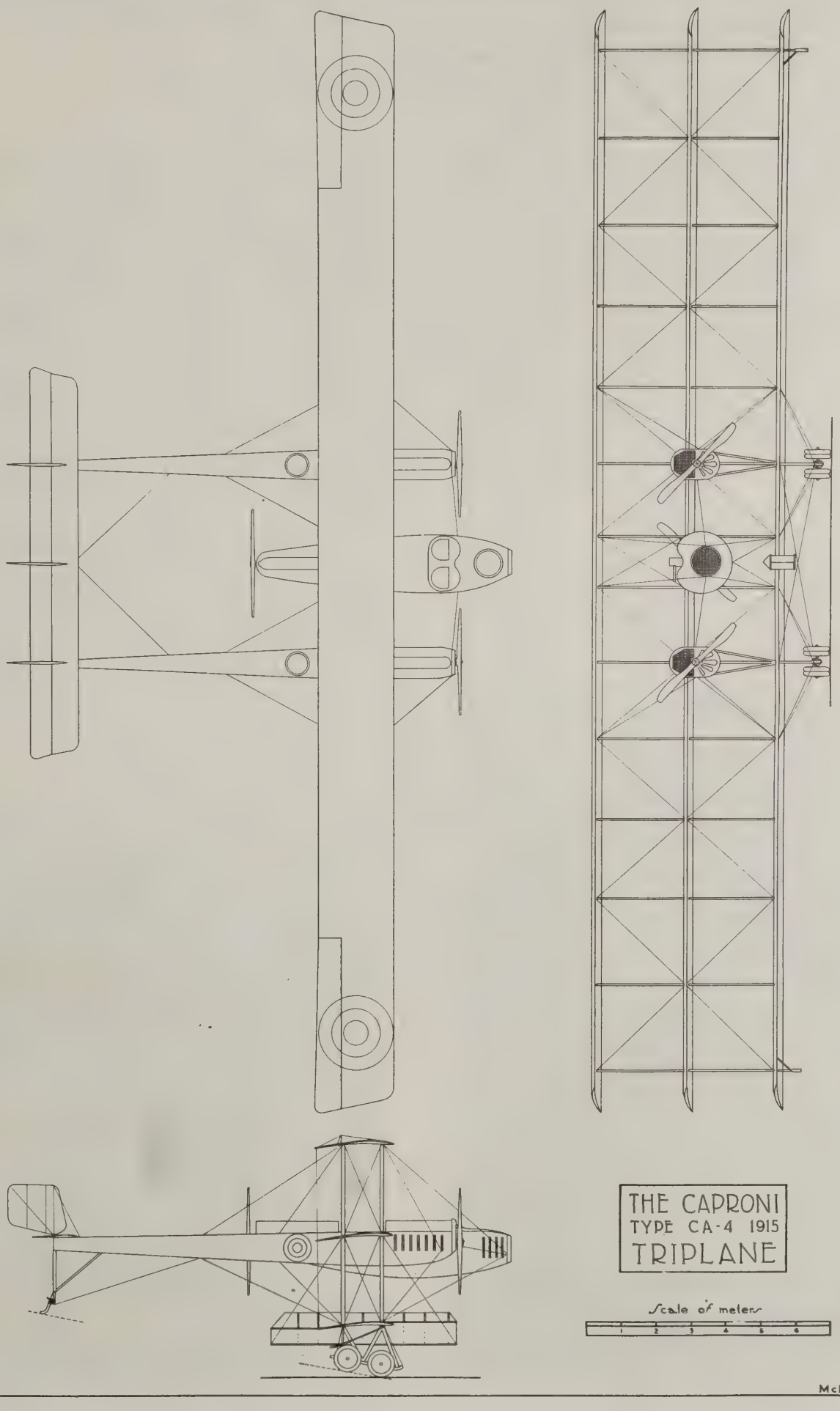
The nacelle is of dirigible form and perfectly streamlined. Two main longerons with compression steel tube struts between them and diagonal steel brace wire and cables form the frame on which a set of ribs are fastened. The outer edge of the ribs determines the shape of the nacelle. Birch veneer and walnut are employed in the construction of these ribs, said construction being of a somewhat likewise manner to that employed for similar elements of flying-boats. The front of the nacelle, upper part, is formed by a cowling made of veneer with interposed layers of fabric.

The two pilots are seated back of the front gunner. Behind is a gasoline tank, and before them a large dashboard for the instruments, while between them they have a board for the controls (gas, spark and altitude adjustage) for the three engines. The gasoline system is controlled by various cocks and a special distributor, all disposed in such a manner as to render them easily accessible to either pilot. In the rear of the gas tank (which is of the same circular section as the nacelle has in that tract) there is a short path that allows free access to the rear motor. The engine bed is braced with adjustable steel tubes and steel braces. The rear part of the nacelle around the engine is also cowled. For the remaining parts, linen and veneer are used for covering.

The fuselages are flat-sided and of the usual construction with four ash longerons, and between them compression struts, steel cables and wire bracing. All the fittings, to which the diagonals are fastened, can be manufactured with the one and the same set of dies. They are extremely simple and light in weight, without welding or bracing, and applied so as to avoid the longerons being pierced by bolts or screws. The front end of the fuselage around the motor is aluminum cowled. The gas tank is placed in the rear of the motor, and an oil tank under it. At a short distance from the trailing edge of the middle wing a seat for the rear gunner, with the usual arrangement for machine guns and ammunition, is installed. From the height of the gunner's seat to the rear end the fuselages are linen-covered. A Pensuti tail skid with shock absorber is at the end of each fuselage.



A Type CA-4 Triple-Motored Caproni Bombing Triplane with vertical radiators


THE CAPRONI
TYPE CA-4 1915
TRIPLANE
Scale of meters
1 2 3 4 5 6
McLaughlin

MAINTAINING CONSTANT PRESSURE BEFORE THE CARBURETORS OF AERO ENGINES REGARDLESS OF THE ALTITUDE

By LESLIE V. SPENCER, M.E.

Formerly Editor of Technical Publications, Experimental Department, Aeroplane Engineering Division, Bureau of Aircraft Production at the McCook Field, Dayton

IN the development of engines for aviation service, an entirely new problem, with which the designer of motors for ground level operation has no concern, is encountered. That is, the aero engine has to contend with a constantly decreasing atmospheric pressure as the altitude increases. This means that unless some method of compensating for the pressure drop is provided, the engine will deliver a decreasing amount of power as it ascends. For instance, at 15,000 feet an engine can deliver only about 60 per cent. of the power which it is capable of developing at the ground (practically sea level).

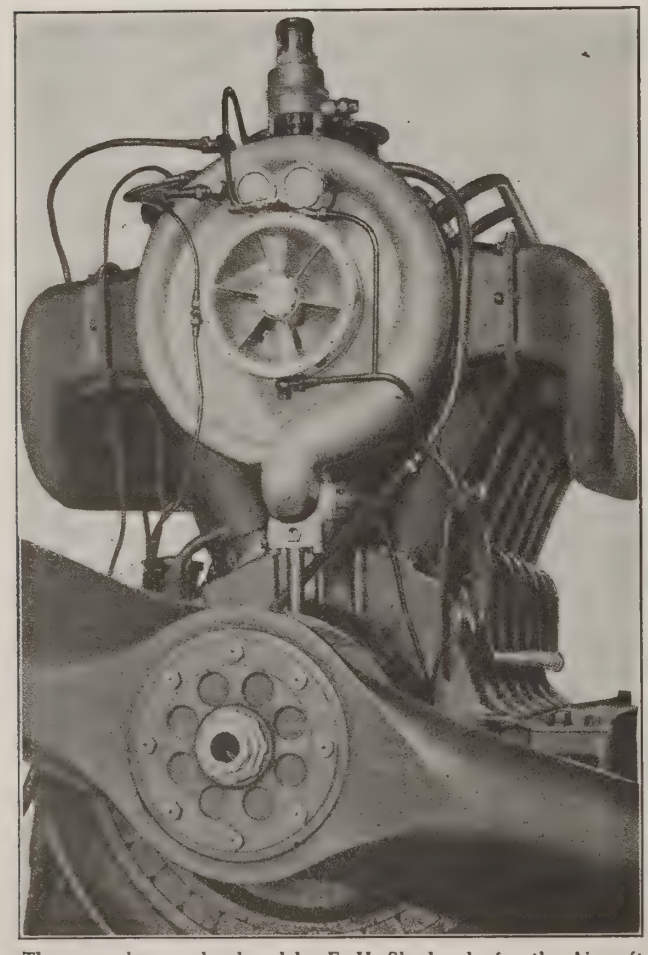
The altitude-pressure chart shown in Fig. 1 brings this out. It will be seen that at 20,000 feet an engine must operate with an intake pressure of approximately half that at ground level. This means that the power of the engine will suffer accordingly.

In order to overcome this difficulty in the operation of engines at high altitudes, engineers have turned to the idea of supercompressing the air sent to the carburetor or carburetors so as to maintain as nearly as possible the ground level pressure regardless of the height. This scheme of constant intake pressure maintenance has been given various names, and perhaps the best of these is the term *supercharging*. Therefore a supercharging device or supercharger may be regarded as a machine which serves to increase the power of an internal combustion aviation engine above that which this engine would normally have at any specific atmospheric pressure. In other words, its function is not to *increase* the normal ground level power of the engine, but to maintain as nearly as possible that power up to the limiting altitude for which the supercharger is designed. It must supply the deficiency between the atmospheric conditions encountered at any particular altitude and those necessary for maintenance of the normal ground level power. The supercompressor must supply only enough additional air, which when added to that obtainable at a given height, will total the amount available at the ground. Accomplishing this, the engine is able to deliver approximately the same power irrespective of its height above the earth, within limits, since for all practical purposes it may be regarded as being ignorant of the fact that it is operating in an atmosphere rarer than that at the ground.

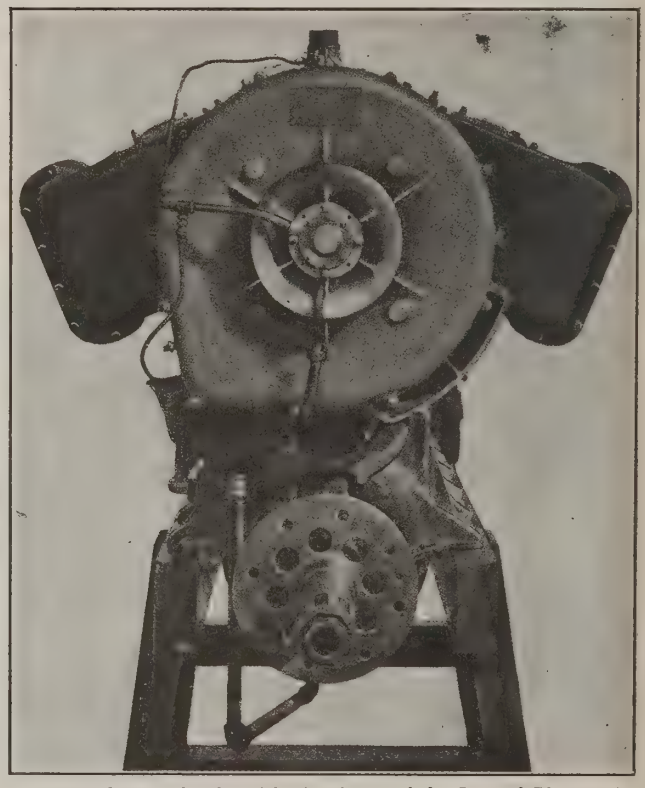
Undoubtedly, had the war lasted longer, we would eventually have had fighting planes operating with superchargers, but up to the time of the signing of the armistice none of the development work either in this country or abroad had progressed to such an extent that it was ready for practical application. Reports have been received from time to time that the Germans were operating planes on the Western Front equipped with supercharging devices, but there has been no corroboration of such rumors. It is certain, however, that the enemy recognized the supercharger as a potent factor in the design of fighting planes, realizing that such equipment would add greatly to the performance qualities of the ships. Little is known as yet as to the exact lines along which the German development has been carried.

In Europe, serious attention, as early as 1915, was given to the development of means for maintaining constant atmospheric pressure at altitudes, but in this country, along with the rest of our aeroplane development, nothing was done by the government in this connection until after our entrance into the struggle. The British, French and Italians each carried on independent experimental development work, and it is a striking indorsement of the turbo-supercharging scheme, as first worked out by Prof. Rateau in France, that at the present time this method of super-compression is most in favor with all experimenters after other systems have been given exhaustive trials. This applies to European development work, which was begun two years before our own. Work in this country has practically all been with the Rateau system, modified mechanically, it is true, but still preserving the same principles of operation as first advanced and tried by Rateau. Full details of this method of supercharging will be taken up in detail later. Suffice it to say here that the Rateau system so far, at least, appears to have the most advantages.

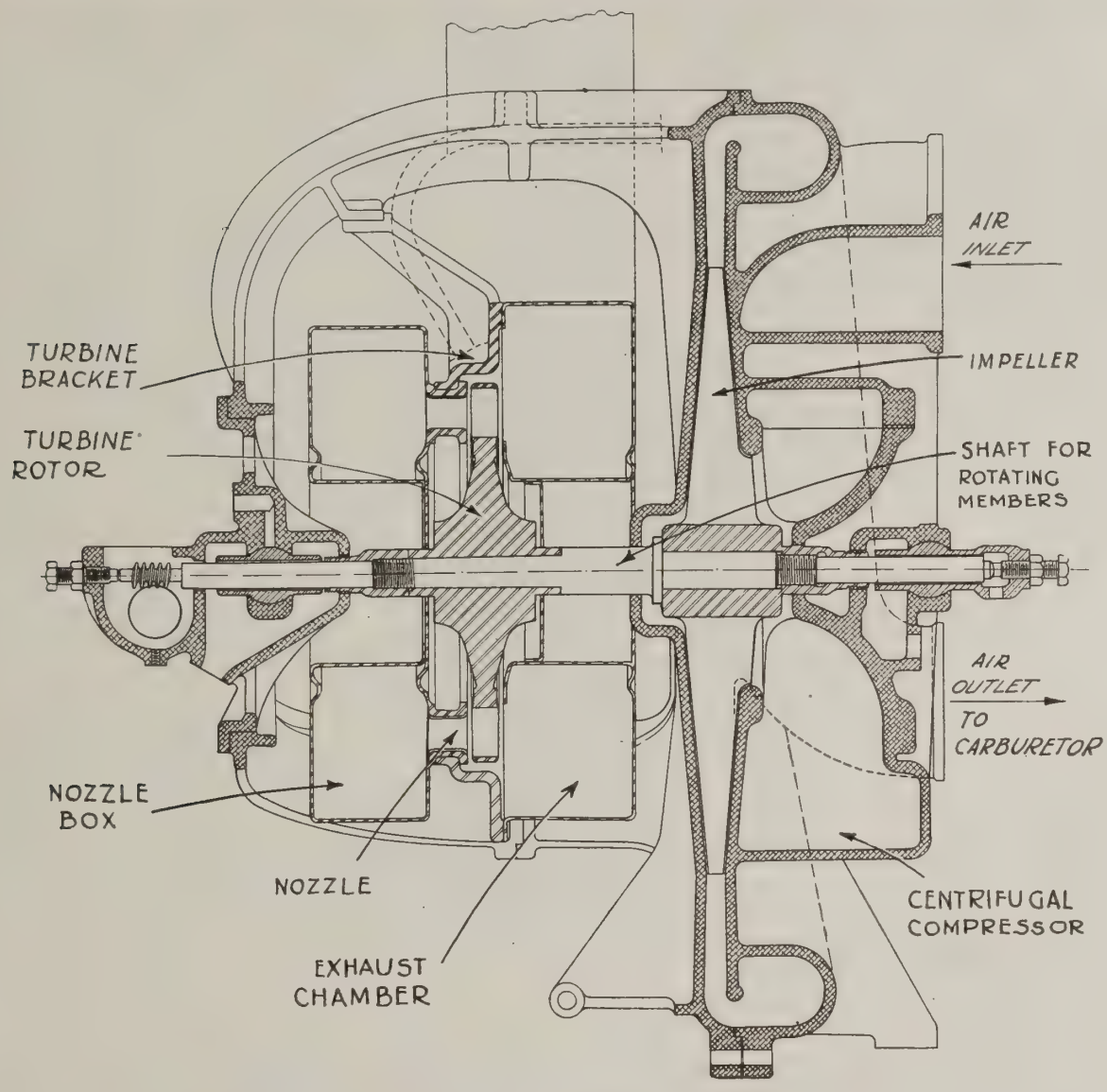
From the foregoing it will be apparent that the problem of keeping a constant pressure before the carburetors is an ex-



The supercharger developed by E. H. Sherbondy for the Aircraft Production Bureau



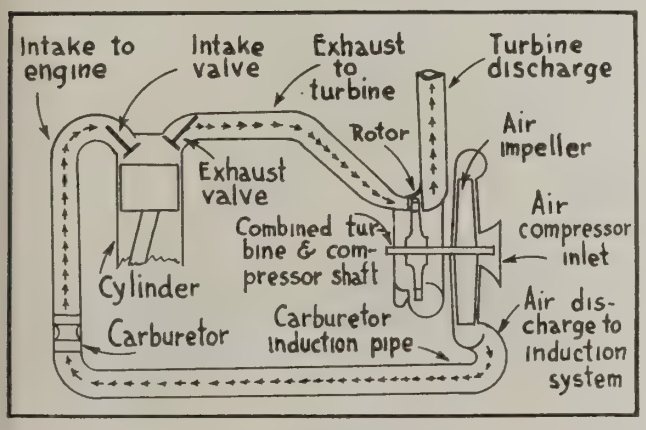
The supercharger developed by Dr. Moss of the General Electric Co.



Cross section of an exhaust turbine driven supercharger designed by Prof. Rateau in France

tremely difficult one. Development work, however, has progressed far enough to make it certain that there are distinct advantages to the idea, and in Europe experimentation has been carried beyond the strictly laboratory stage, a number of planes both in France and England having been flown experimentally with superchargers operating on the engines. Experimental work in this country, while never brought to the point of applying the devices to planes in actual flight, has been carried forward to the extent that one of the devices developed during the war has been tested with gratifying results at the summit of Pike's Peak which has an altitude of some 14,000 feet. All altitude tests that have been made have borne out the theories involved, and have shown conclusively that all that hinders the practical application of the machines to planes is mechanical difficulties, which are rapidly being overcome as the experimental work progresses.

Although other methods of maintaining constant inlet pressure are possible, all the systems of supercharging which have been experimented with so far depend upon the general scheme of connecting the air intake of the carburetor with the air outlet from a compressor, which is driven by one of several methods. The degree of compression of the air sent to the



The cycle of the exhaust turbine supercharging system shown diagrammatically

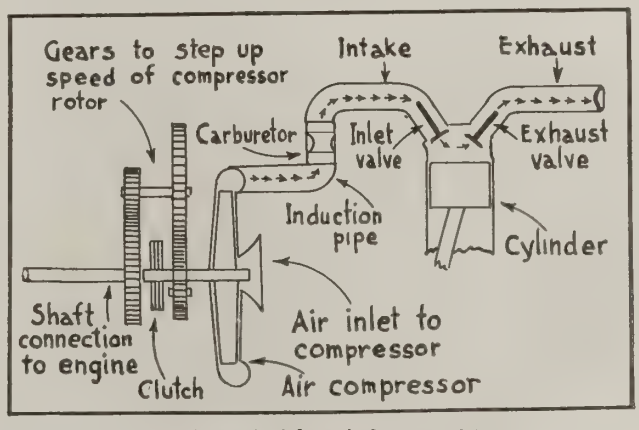


Diagram of operating principles of the gear driven compressor system of supercharging

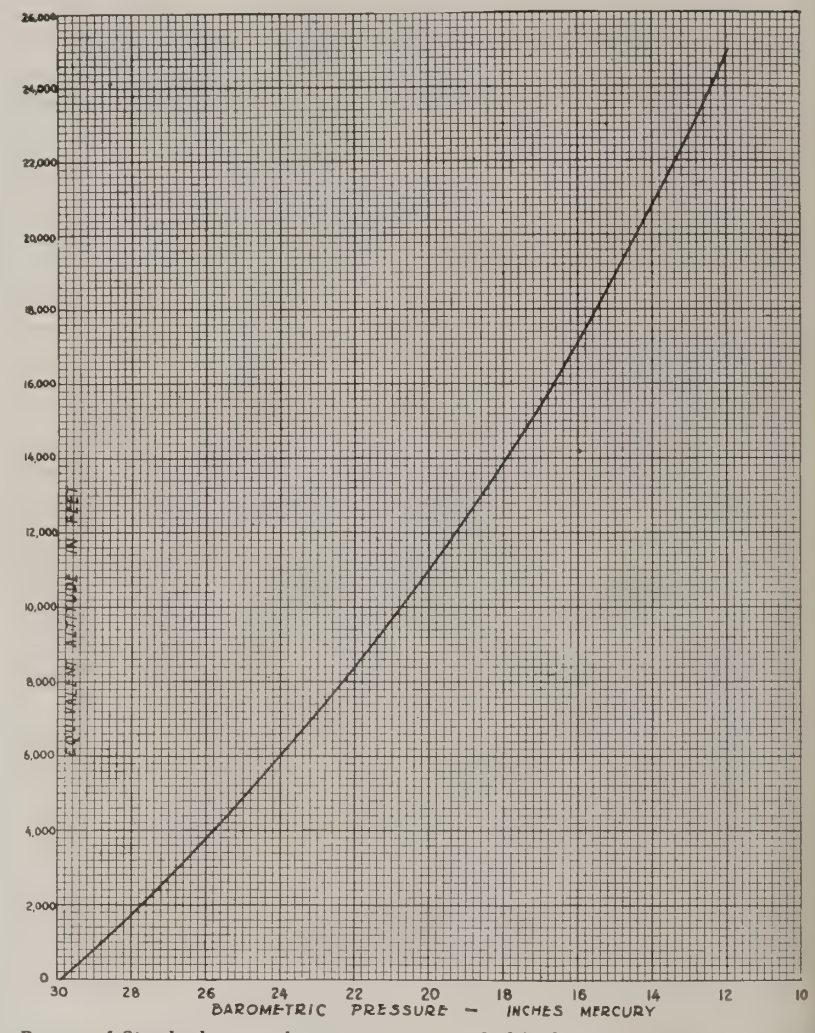
carburetor intake is governed by the speed of the compressor which is in turn either automatically controlled to supply the right amount of air for any given altitude, or is governed by some mechanical means.

Three types of compressors could be used for the purpose. These are the reciprocating, the centrifugal and the rotary designs. In order to make use of a reciprocating compressor, its volumetric displacement in a given time must be in excess of that of the engine. This eliminates this type, since it would require larger diameter cylinders than the engine, which of necessity would mean that the compressor would be as large if not larger than the engine itself.

The rotary compressor or blower has been tried under all conditions in competition with the centrifugal type of compressor by the British at the Royal Aircraft Establishment, and has been discarded in favor of the latter. Although light and of small bulk, the rotary blower does not appear to be capable of extended operation at high speed, due to mechanical limitations. Its capacity is also not so great for a given speed as that of the centrifugal type, in the small sizes such as required for such service.

In general, the centrifugal form of compressor unit has proven the most desirable when all considerations are weighed. Having a minimum of working parts, being very compact for a given capacity and being capable of operation satisfactorily at top speed over long periods of time due to its simplicity of construction, the centrifugal compressor would seem to warrant exclusive attention in competition with the other two possible types. As a matter of fact experimenters with compressors for this service have all come to this conclusion, and only the centrifugal type is now thought of when laying out a system for supercompression.

As to the methods of driving the compressor, there are also three possibilities. It can be direct-connected through the engine just as a magneto or other accessory is operated. The gear train with the crankshaft or other driving shaft of the engine just as a magneto or other accessory is operated. The gear train must, of course, be so designed as to produce the proper relative rotative speed of engine and compressor, so as to give the rotor the requisite speed for the purpose in hand. As a second consideration, the compressor might be driven by a small steam turbine, the steam being produced by suitable utilization of the heat of the exhaust gases from the engine. A third alternative is to drive the compressor impeller by means of an exhaust gas turbine, receiving its energy directly from the engine exhaust gas.



Bureau of Standards curve between pressure and altitude at temperature of 50°F.

Taking these up in the order named, much experimental work has been carried on with the direct-connected means of drive through an intermediate gear train. England and Italy have done a great deal of experimenting with the gear drive, and have experienced great difficulty in coping with the severe stresses developed in the rapidly operating mechanism due to sudden fluctuations in the speed of the engine. In order to take care of these variations in the speed of the engine so as to relieve the mechanism of any ill effects of sudden changes, some form of clutch or a series of clutches can be inbuilt into the drive to absorb them. But this means added complication that is not altogether desirable. Consequently, those who at first favored gear drives are gradually leaning towards the turbine drive.

Turning to a consideration of the steam turbine, this need not be given very serious attention, in that its use would involve the installation of a boiler, condenser and other complicated apparatus necessary to steam generation. Such a system of turbine propulsion has never been tried, but it is entirely possible to utilize the heat of the exhaust gases to produce the steam. Although such an arrangement could undoubtedly be built to operate satisfactorily in the laboratory, it has no practical value for application to an aeroplane, where every added complication is serious, and where every added ounce of weight is important. Aside from these considerations, a steam generating set would be exceedingly hard to incorporate within the narrow confines of the engine part of the fuselage.

We therefore arrive at the conclusion that the turbine driven by the energy of the exhaust gases offers the best possibilities from every standpoint, and that this conclusion is correct is evidenced by the fact that although England primarily designed its supercharger systems for direct-connection of the compressor to the engine through gearing, this idea has practically been abandoned at the Royal Aircraft Establishment in favor of the exhaust-gas turbine-driven centifugal compressor. This is the Rateau system, with which the efforts of the French engineers have been almost entirely concerned.

The exhaust-gas turbine can be connected direct with the exhaust ports of the engine through special manifolding replacing the standard manifolds, so that all the exhaust must pass through the turbine nozzles and give up its energy to the turbine rotor before being allowed to escape into the atmosphere through the turbine discharge passage. In the designs which have been experimented with thus far, the turbine rotor and the impeller of the centrifugal compressor are mounted on the same shaft. Thus the building of the turbine and compressor as a unit is made possible, resulting in an exceedingly compact machine, which in most instances can be mounted directly on the front of the engine. By this arrangement, the outfit takes up a minimum of space, and although such a position of the device makes it necessary to remove the radiator from the front of the fuselage, this offers no difficulties, since a great many designers of planes place the radiator in the wings or at the sides, or at the bottom of the fuselage from choice.

It will be seen that inasmuch as there is no direct mechanical connection between the turbo-compressor and the engine, this type of apparatus is entirely free from troubles due to sudden variations in the rotative speed of the engine, which is one of the principal objections to the gear-driven compressor installation.

In conducting the engine exhaust gases to the nozzle box of an exhaust gas turbine, and thence through nozzle ports to the turbine wheel, no difficulties are encountered, except that the high temperatures of the exhaust gases must be coped with. To date, this has been the main trouble designers of turbo-superchargers have had, viz., designing the device in such a way that the excessive heat can be cared for without damage to the turbine parts. This trouble seems to be close to satisfactory solution, and it is not looked upon as being

(*Continued on page 264*)

THE 270 H. P. BASSE-SELVE AERO ENGINE

[*We are indebted to the Technical Department (Aircraft Production), British Ministry of Munitions, for the following details concerning the latest German aero-engine development.*—EDITOR.]

Introductory Note

The following report on the design of the 270 h.p. Bassé-Selve engine is based on a detailed examination of the engine (No. 550) taken from the remains of a German Rumpler two-seater biplane (R.A.F. identification No. G/5BD/14), which was shot down and destroyed in France on May 31, 1918. Unfortunately, this is the only engine of its type which has been captured up to the time of writing, and as it was seriously damaged it is impossible to carry out any power and consumption tests of the engine; consequently the following report deals with design and construction only. Certain figures connected with the performance have, however, been calculated by assuming the engine speed and brake mean effective pressure to correspond approximately with those of other German engines of about the same capacity. The figures adopted for these items are as follows:

Normal engine speed.....1,400 r.p.m.
Normal B.M.E.P. at 1,400 r.p.m., 110 lbs. per sq. in.

All the figures in the data at the end of this report, which are based on the above assumption (and therefore only to be accepted with reserve) are marked with an asterisk. Actual figures and test reports on the running of these engines will be issued as soon as an engine of this type is captured in good condition.

General Description

These engines, manufactured by Bassé and Selve, Altena, Westphalia, have but recently appeared in the field. In most of their leading details of construction they closely resemble both the 260 h.p. Mercedes and 230 h.p. Benz engines, on which the design is evidently based. Markings on the engine indicate the year of manufacture to be 1917, the crankshaft being marked "A. G. Krupp, Essen, 1917." The nominal rating of the engine according to a cast plate on the crankcase is 270 h.p., and the norman engine speed would probably be about 1,400 r.p.m. Assuming the B.M.E.P. to be 110 lbs. per sq. in. at 1,400 r.p.m., the power developed would be approximately 260 b.h.p.

The accompanying photographs show the engine to be of the usual six-cylinder water-cooled type, the bore being 155 mm. and the stroke 200 mm., *i.e.*, 5 mm. less in the bore and 20 mm. longer in the stroke than the 260 h.p. Mercedes engines. Owing to the damaged condition of the cylinders and pistons it has been difficult to ascertain the exact clearance volume. This is approximately 1,130 c.c., giving a compression ratio of 4.34:1, which is lower than any of the previous enemy engines. Twin inlet and exhaust valves are fitted in the head of each cylinder, and the method of water cooling the exhaust valve stems by an annular passage, which completely surrounds the valve stem guides, is a novel detail of construction in enemy engines. The valves are operated by an overhead camshaft, running in bronze bearings in a cast aluminum casing; the design of the valve rockers and valve gear is worthy of notice. An unusual type of compression release gear is used, which is of remarkably simple construction. Aluminum pistons are fitted. These are machined all over, inside and out. The slightly convex crowns are supported by conical pillars which bear upon the center of the gudgeon pins through the slotted small ends of the connecting rods. This construction, together with the design of the tubular



Bassé-Selve Engine—View of cylinder

connecting rods, is essentially Benz practice, whilst the construction of the steel cylinders is taken from the 260 h.p. Mercedes design, but incorporates several improvements.

A large oil-cooling radiator is attached to the bottom of the crankcase, and is used in conjunction with a new design of duplex-plunger oil pump, which works vertically at the rear end of the crankcase. The design of the oil pump is somewhat similar to that now used on the new 200 h.p. Austro-Daimler engines. Two separate two-jet carburetors fitted with annular floats are employed. These are apparently equipped with some form of altitude adjustment. Unfortunately, only one incomplete carburetor was found on the engine, the parts of which are shown in Fig. 20. No details can be given of the construction of the water pump, as this component was missing from the engine. The crankshaft is of ordinary, but exceptionally heavy, design. The main journal bearing shells are machined with a screw-thread bedding for the white metal linings in a similar manner to the 300 h.p. Maybach engines. The propeller hub is fitted to a detachable tapered extension piece, which is bolted by a flange to the end flange of the crankshaft. Further details of the design are given in the following description, and the leading particulars of the engine are given in the accompanying data, which are as complete as the condition of the engine allows.

Details of Construction

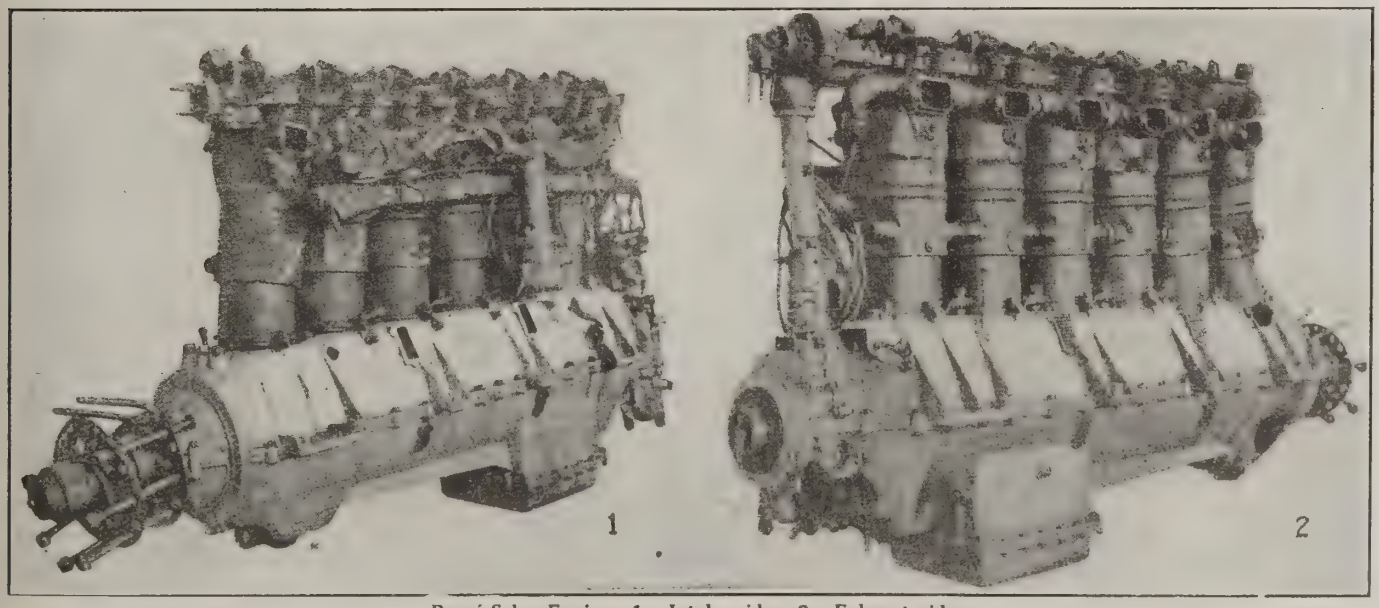
Cylinders

A sectional drawing showing most of the construction of the steel cylinders is given in Fig. 6. The cylinder barrels are screwed into the heads and welded in position. This construction is similar to the 260 h.p. Mercedes, as also are the eight ribs machined on the outside of the barrels. The cylinder heads are of cast steel, and the four valve pockets in each cylinder are cast integrally with the head. The formation of the combustion chamber and the unusual inclination of the valves at 23.5 deg. to the vertical axis of the cylinder are interesting points. The formation of the water passages in the heads and the construction of the water jackets have evidently received the most careful consideration in this engine, especially in the cooling of the exhaust valves. The cylinder water jacket capacity is remarkably high, and the water passages through the cylinder heads are exceptionally good. The water connections between the cylinders are all on the exhaust valve side, and are of large diameter. The water connections in the cylinder heads are arranged as close up to the exhaust valves as possible.

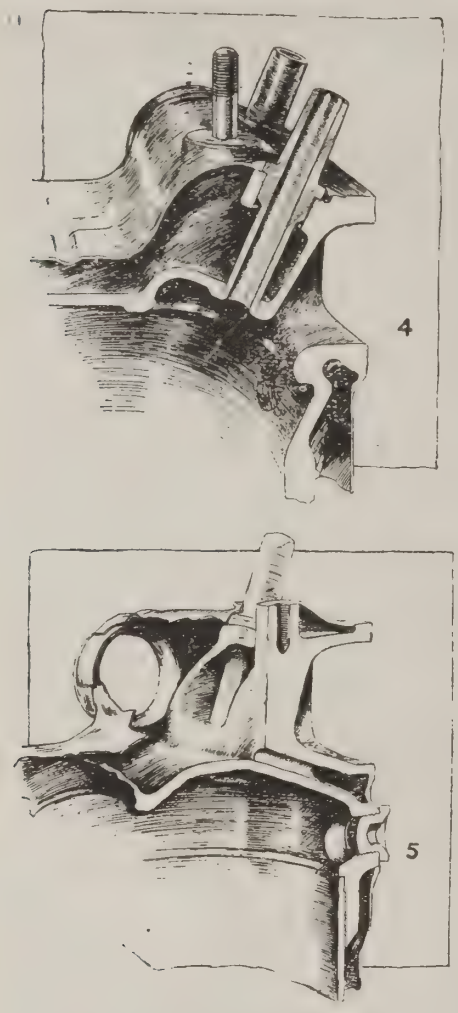
The construction of the valve stem guides is as follows:

The valve guides are steel tubes lined with phosphor bronze; they are pressed into the valve pockets, and are acetylene welded in position top and bottom; an annular passage cast in the exhaust valve pocket entirely surrounds the central portion of each exhaust valve stem guide for a distance of 35 mm. These passages are shown in the sketches, Figs. 4 and 5. The water jackets are of pressed sheet steel, with two angular corrugations, and the bottom joints of the water jackets are welded to bevelled flanges turned on the outside of the cylinder barrels. This joint is of the same design as is now used in the 200 h.p. Austro-Daimler engines.

A water passage is cast in the cylinder heads between each pair of exhaust valves, as shown in Fig. 5, which allows of water circulation completely around the head of each exhaust valve, and the exhaust valve stems are completely water cooled. The cylinders are bolted down to the crankcase by steel dogs, which clamp the base flanges of the cylinders at six points. The cylinders are registered in the crankcase by spigots extending 8 mm. below the base flanges. Each cylinder is held down at six points by means of dogs which clamp the cylinder base flanges on each side. These dogs



Bassé-Selve Engine—1. Intake side. 2. Exhaust side



4. Sketch of water-cooled exhaust valve seatings

5. View of water cooling passages around exhaust valve guides

are secured by studs screwed into the top half of the crankcase. The main journal bearing bolts, which pass through the top half of the crankcase, are also used to hold down the cylinders by bridge clamps between each pair of cylinders, as shown in the photograph. The lower halves of the main bearings are integral with the bottom half of the crankcase. Locknuts are screwed on the upper ends of the main bearing bolts beneath the cylinder holding-down dogs, so that the cylinders can be removed without disturbing the main bearings.

Valves

The inlet and exhaust valves are of the same diameter in the heads and stems, and of similar section. The valves measure 61.0 mm. across their slightly convex heads. The effective diameter of the valves at the valve seatings is 56 mm. The valve seatings of each pair of valves merge into single inlet and exhaust ports in the cylinder heads. These are rectangular, and the passages are remarkably short and free.

Single valve springs are fitted to each valve, and the wire for the springs is of light gauge (approximately 4.0 mm. diameter). The same design of valve spring is used for both inlet and exhaust valves, but the exhaust springs are more compressed. The ends of the valve stems are screwed to take the spring collars, which are locked by a plain castellated locking nut and split pin.

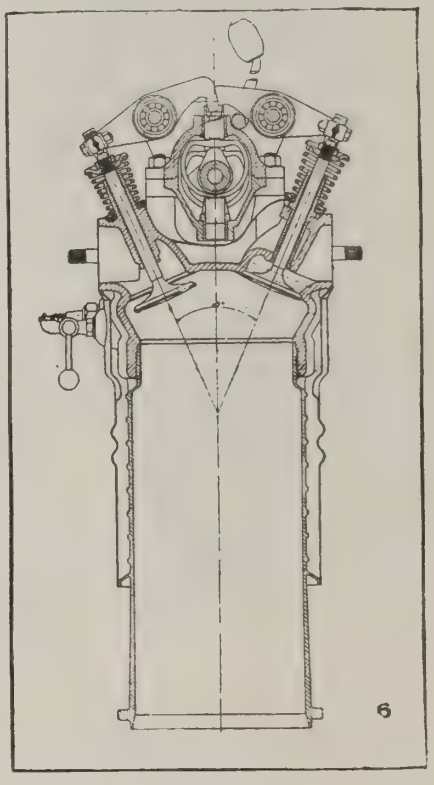
Valve Gear

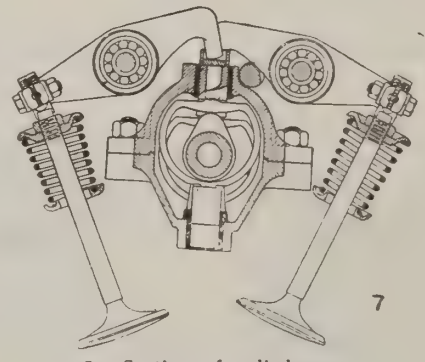
The general lay-out of the valve gear is shown in the cross-sectional arrangement drawing, Fig. 13, and presents some interesting details of design. The camshaft runs in eight comparatively short plain bearings of phosphor bronze, which are held in split aluminum housings of hollow section and large diameter. These are carried in the halves of a cast aluminium camshaft casing, and are located by dowel pegs in the usual way. The camshaft is made in two parts, joined together at the center by two flanges and four short bolts. This valve gear is very similar to that used on the Peugeot racing cars (four valves per cylinder) about seven years ago.

Each pair of valves is depressed by a rocker lever mounted on ball bearings. The inner arm of each rocker lever is operated by its cam through a tappet in the top half of the camshaft casing. The design of these tappets is clearly shown in the cross-sectional drawing, Fig. 7, and in the sketch, Fig. 9. The tappets are made in the form of stirrups which encircle the cams, and are supported in bronze bushes at the top and bottom ends. The cams and their tappets are case-hardened, and the camshaft bearings and tappets are lubricated under pressure through the hollow camshaft.

Compression Release

A simple form of compression release gear is used in place of the usual half compression cams and mechanism. This is operated by means of a rod which lies horizontally along the outside of the camshaft casing directly underneath the exhaust valve rocker arms. This rod has slots cut in it (as shown in Figs. 6 and 10), which lift the exhaust valve rockers when the rod is partially rotated by means of the hand





6. Section of cylinders

7. Details of valve gear

lever fixed to the rear end of the horizontal rod. The purpose of this compression release is apparently to facilitate swinging the propeller.

Pistons

The aluminium pistons are illustrated in Figs. 11 and 12.

The crowns are considerably domed and the pistons are machined all over, both inside and out. Both the material and the machining are excellent. No ribs are formed on the inside of the pistons, the crowns being supported by a hollow conical pillar which bears on the center portion of the gudgeon pin, as in the Benz and other engines. This conical pillar is integral with the piston crown. The inside of the pillar is machined through a hole in the center of the crown which is afterwards plugged with a flanged cap screwed into the center of the crown, as shown in the drawing. Three cast-iron compression rings are provided above the gudgeon pin and one at the bottom of the skirt, all with stepped joints. The machining processes of this type of piston are obvious from the illustrations. No bushes are provided as liners in the gudgeon pin bosses. The gudgeon pin is fixed in position by a large hollow set-pin which passes through both sides of the boss and gudgeon pin as shown. The weight of each piston complete with rings is 5.18 lbs.

Connecting Rods

These are of tubular section, and closely resemble the Benz connecting rods in design, but are of considerably larger proportions throughout. The inner surfaces of the big-end shells are machined with a fine pitch screw thread to take the white metal liners as in the 300 h.p. Maybach engines. The crankshaft journal bearings are machined in a similar manner. Other details of the connecting rods may be seen in the photographs attached. These rods are particularly heavy, the weight of the complete connecting rod being 9.0 lbs.

Crankshaft

The crankshaft is of normal design, and apart from its massive proportions requires no special description. All the hollow crankpins and journals are of the same internal diameter (40 mm.), and are plugged with gunmetal discs expanded into grooves. All the crank webs are drilled for lubrication with oil passages connecting the hollow crankpins and journals. A large double-thrust ball race is fitted to the front end of the crankshaft by means of a shoulder machined on a flange just behind the propeller hub; the thrust races are threaded on over the cranks, and are secured by a large screwed collar and spring locking ring. The main distribution bevel gear floats on the splined rear end of the crankshaft, and is fitted with a thrust ball race between the bevel and the rear end of the journal bearing.

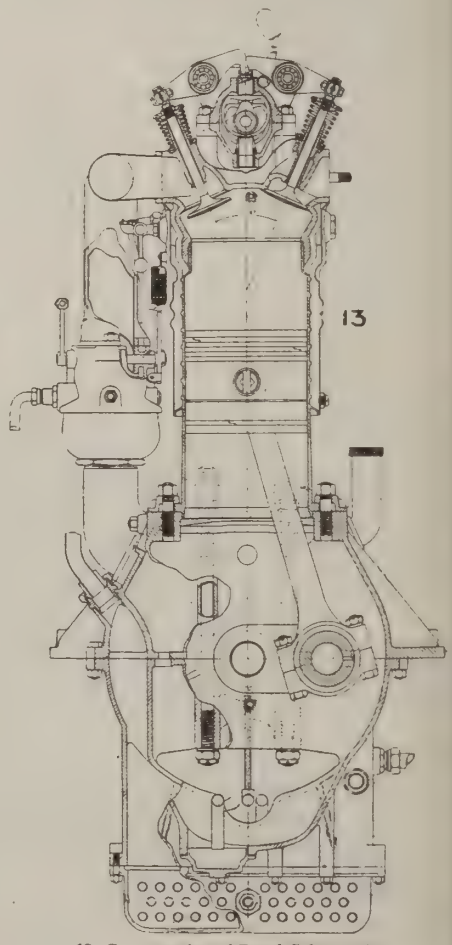
Propeller Hub

This is of the standard 260 h.p. Mercedes type, and is fitted to a short tapered extension of the crankshaft. This extension is detachable, being bolted to a flange on the crankshaft; the propeller hub is secured on the tapered extension by a key. The standard Mercedes locking device is used.

Carburetors and Induction

Unfortunately, only one incomplete carburetor was found on the engine. This is shown dis-

(*Continued on page 253*)



13. Cross-section of Bassé-Selve engine.

13. Cross-section of Bassé-Selve engine

SECOND PAN-AMERICAN AERONAUTIC CONVENTION AND EXHIBITION

To Be Held Under the Auspices of The Aero Club of America, The Aerial League of America and the Pan-American Aeronautic Federation.

From Thursday, May 1st, 1919,
to
June 1st, inclusive,
at
Atlantic City, N. J.

Intercollegiate Contests Throughout the Summer

CONTESTS TO BE HELD EACH SATURDAY

(1) Seaplane Contests (general),
(2) Curtiss Marine Flying Trophy and Prizes,
(3) Intercollegiate Seaplane Contests,
(4) Land Aeroplane Contests,
(5) Dirigible Contests,
(6) Kite Balloon Speed in Ascending and Descending, and Maneuvering Contests,
(7) Parachute Competition,
(8) Aviette (bicycles and motorcycles with wings) Contests.

EVERY DAY ACTIVITIES

(1) Exhibits of Aeroplanes, Motors and Accessories on the Steel Pier,
(2) Demonstrations and tests of Seaplanes, Land Aeroplanes, Motors, Dirigibles, Kite Balloons, to prospective purchasers and representatives of different governments,
(3) Aerial Passenger Carrying by seaplanes and dirigibles, and kite balloon ascensions,
(4) Moving pictures and Addresses by leading authorities on most important phases of aeronautics.
(5) Competition for the Pulitzer Trophy.
(6) Competition for the Atlanta Journal Trophy.
(7) Competition for the Curtiss Marine Flying Trophy.

The Governments and Aeronautic, Sporting, Scientific, Industrial and Civic organizations of the United States and all the countries in the world, excepting Germany and her allies, are invited to send representatives to attend this great aeronautic event. On arrival in the United States these representatives should call at the Headquarters of the Convention Committee at No. 297 Madison Avenue, New York City, to register and receive their official badges and the official program.

In the event that it is more convenient for them to go directly to Atlantic City they will register at the offices of the Convention located at the following Atlantic City hotels: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis and Hotel Haddon Hall.

Representatives of the Convention Committee will be at the Bureaus of the Aeronautic Convention at the above-named hotels and will issue the official badges which admit the bearer to the Aeronautic Hall, as well as the Aero Exhibition on the Steel Pier, the judges' enclosure during contests, and to the Aerodrome and seaplane stations where the aircraft and motors will be demonstrated.

All communications until May 1st should be addressed to Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

Entries for the contests should be addressed to the Contest Committee, Aero Club of America, 297 Madison Avenue, New York City.



DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

THURSDAY, MAY 1ST

Opening of Convention and Exhibit.

AFTERNOON—Reception at Aeronautic Hall on the Steel Pier. Addresses by United States Government State and aeronautic authorities.

EVENING—Aero Show and addresses by officials.

FRIDAY, MAY 2ND

AFTERNOON—Aero Show. Preliminary tests of seaplanes, dirigibles and kite balloons.

EVENING—Moving pictures and address on flying for sport and pleasure.

SATURDAY, MAY 3RD

AFTERNOON—Seaplane and dirigible races, and kite balloon ascending and descending contest.

EVENING—Ball.

SUNDAY, MAY 4TH

MORNING—Memorial service by eminent Divine for the dead airmen.

AFTERNOON AND EVENING—Reception to allied aces and heroes of the air and their parents, and announcement of the award of the Aero Club of America Medal of Valor, and the Aerial League of America Diploma of Honor.

MONDAY, MAY 5TH

AFTERNOON—First parachute contest for $500 Bennett Prize.

EVENING—"The Large Dirigible and Its Value for Transportation." Representatives of railroads, express, steamship and other transportation organizations invited to attend.

TUESDAY, MAY 6TH

AFTERNOON—Illustrated addresses on "Aerial Forest Patrol." Forestry Department of every State invited.

EVENING—"Work of Aerial Police Squadrons, and Why Every City Should Have One."

WEDNESDAY, MAY 7TH

AFTERNOON AND EVENING—Aerial Mail Day. Illustrated address on, and consideration of, "Aerial Mail Planes." Chairman of Post Office and Post Roads Committees of House of Representatives and Senate, and Postmaster General Burleson invited to deliver addresses. (26,000 United States Postmasters, and Chambers of Commerce of 13,000 cities invited to attend.)

THURSDAY, MAY 8TH

AFTERNOON AND EVENING—Illustrated addresses on the "Need of Municipal Aerodromes, and the Part to be Played by Aircraft in City Planning." Chambers of Commerce and City Planning Commissions of 13,000 cities invited to attend.

FRIDAY, MAY 9TH

AFTERNOON—Arrival of seaplanes and army planes from Army and Navy Air Stations. Second parachute competition for the $500 Bennett Prize.

EVENING—Illustrated addresses on "Latest Developments in Aerial Warfare and Adventures in Aerial Warfare," told by famous aces.

SATURDAY, MAY 10TH

AFTERNOON—Army, Navy and Marine Corps Day. Aerial contests and tournament.

EVENING—United States Army and Navy Officers' Reception. Reception and addresses at Aeronautic Exhibition Hall on the Steel Pier.

SUNDAY, MAY 11TH

AFTERNOON AND EVENING—Presentation of the flags by each State of the United States to the Aero Squadrons representing the States. Each State will present a flag to each Aero Squadron, the members of which were overwhelmingly natives of that State. The presentation will be made by representatives from the State and the Aero Club and Aerial League branch of that State. All States and cities invited to send delegates, and Army, Navy and Marine Corps to send representatives.

MONDAY, MAY 12TH

AFTERNOON—Demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night." All national advertisers and advertising agents invited to attend.

EVENING—"Pan-American Aerial Transport Over Land." Addresses by members of the commissions of the 20 Latin-American Republics.

TUESDAY, MAY 13TH

AFTERNOON AND EVENING—"Pan-American Aerial Transport Over Water." Addresses by members of the 20 Latin-American Republics' Commissions.

WEDNESDAY AND THURSDAY, MAY 14TH AND 15TH

AFTERNOONS AND EVENINGS—"The Airways and Aerial Transport in Europe, Canada, Africa, Australia and Asia."

FRIDAY, MAY 16TH

AFTERNOON AND EVENING—"Aerial Navigation Instruments for Flying Over Land and Water." Aviators, navigators, scientific instrument makers and aeronautic experts invited.

SATURDAY, MAY 17TH

AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.

EVENING—Extensive exhibit of aerial photographs and photographic apparatus. All photographers, professional and amateur, and makers of photographic apparatus invited.

SUNDAY, MAY 18TH

AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH

AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."

EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH

AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST

AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.

EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22nd

AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Telegraphic and Climatic Factors in Relation to Aeronautics.

FRIDAY, MAY 23RD

AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulation of Air Traffic." (First day.) Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH

AFTERNOON—Races and contests.

EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH

AFTERNOON AND EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK.

MONDAY, MAY 26TH

AFTERNOON—"Aeronautic Engineering Problems and Their Prospective Solution."

EVENING—Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH

AFTERNOON—"Factors That Increase the Efficiency for Large Dirigibles."

EVENING—"Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH

AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."

EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH

AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."

EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)

AFTERNOON—Dirigible races, kite balloon speed ascending contest; parachute contest.

EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST

AFTERNOON—Seaplanes, land planes and dirigible contests. Aviette competition at which all cyclists and makers of bicycles and motorcycles will be invited.

EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST

AFTERNOON AND EVENING—Award of prizes and diplomas for all events.

HOME!

The boys are home!

A year and more ago they marched away and left their homes and happiness and friends behind to go to France to fight for us. They fought—they won—and now they're home again.

They've done their part, those boys of ours—they saw it through.

And we who crowd the curb and wave our hats and cheer to let them know we're glad—how about us?

We bought Liberty Bonds to put up the money to buy the guns those fellows fought with. They're proud of us.

They know we backed them to our limit while they were "over there."

But our work isn't over.

We can't let the job those boys have done in France go unfinished.

We've got to see it through.

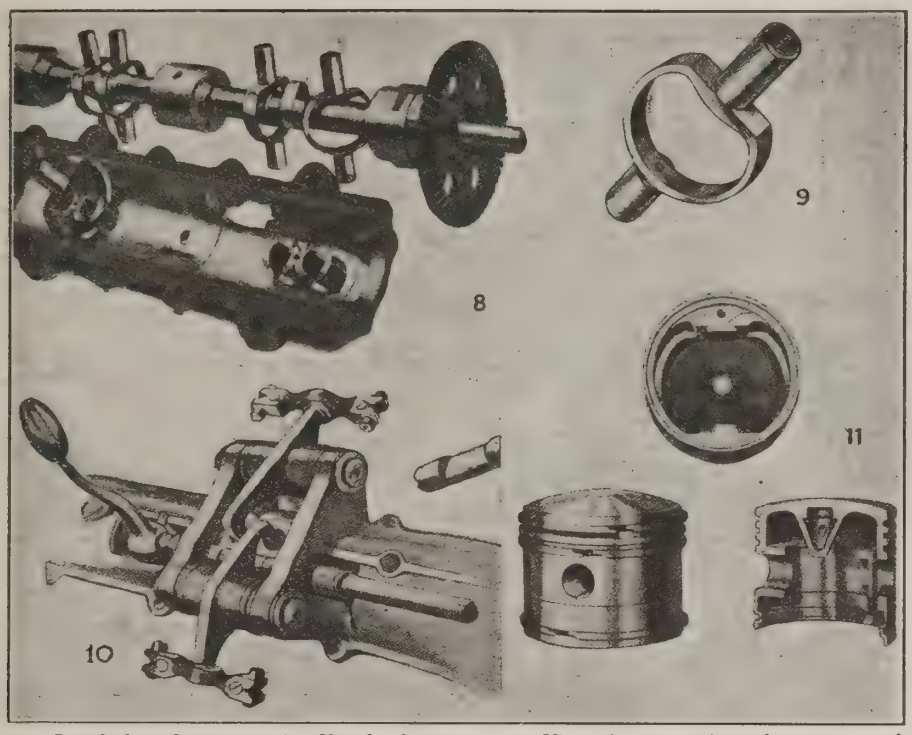
We've got to raise the money to make sure of the Victory they've won and bring the rest of our soldiers back.

The Victory Liberty Loan is coming—Let's see it through!

FINISH THE JOB

GOVERNMENT LOAN ORGANIZATION
Second Federal Reserve District
LIBERTY LOAN COMMITTEE
120 Broadway - - - - New York

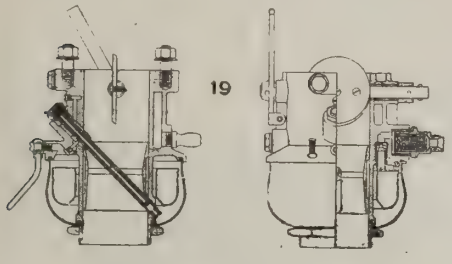
This space has been donated by Aerial Age Weekly



8. Camshaft and tappets. 9. Sketch of tappet. 10. View of compression release gear and valve rockers. 11. Three views of aluminum piston

(*Continued from page* 248)

mantled in Fig. 20. The carburetors, which are quite separate, are of unusually light and simple construction compared with previous German design. The floats and float chambers are of the annular type, and encircle the main air intakes directly below the throttles, which are of the ordinary butterfly type. The body of each carburetor and throttle is made of cast aluminium and the main jet is formed by a hole drilled in a tube which is screwed diagonally into the water-jacketed body of the carburetor, and lies across the choke tube directly beneath the throttle. The jet tube is open at the bottom end, and projects into the bottom of the annular float chamber, which is made of pressed sheet steel of very light gauge. The pilot jet is formed by a second tube of small diameter inside the main jet tube. This pilot jet tube is also open at the bottom end, and is drilled radially with a small hole, just above the main jet. It communicates with the mixing chamber just above the throttle by a passage drilled in the carburetor body. An altitude compensating control is fitted. This takes the form of a pipe opening into a passage drilled in the top of the float chamber, and no doubt connected by a rubber tube to a control



19. Section of carburetor

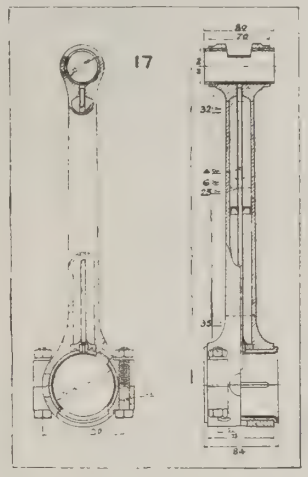
cock in the pilot's seat. Each carburetor feeds three cylinders through a branched induction manifold, the vertical part of which is water-jacketed. The total weight of each carburetor complete should not exceed 2 lbs.

Crankcase

The design of the top half of the crankcase requires no description, being constructed on Mercedes lines; it is shown in the engine photographs. The lower half also closely follows standard Mercedes design, with the exception of the oil reservoir and oil-cooling radiator on the bottom of the rear end. The construction of this cooler may be seen in Figs. 21 and 22; it consists of a cast aluminium oil chamber, having a number of thin aluminium tubes (12 mm. diameter) running longitudinally in three rows, and expanded at the ends. The cooler is bolted to the bottom flange of an oil reservoir below the base chamber, and is not an oil sump, inasmuch as there are no oil connections between it and the base chamber. This oil reservoir and cooler is provided for the purpose of forming the service oil tank, and for cooling the oil on the scavenger circuit; separate oil sumps are provided at each end of the base. (See notes on Lubrication.) For the purpose of refilling the supplementary oil tank and cooler a passage cast in the side of the base chamber communicates with the space between the transverse webs of the main bearing housings. At the bottom of the crank chamber a trough is formed in the casting. This is semi-circular in cross section, and is provided to take the main oil supply and return pipes. Two air intake passages are cast on each side of the crank chamber, as shown in Fig. 21; they are arranged to communicate with the carburetor through passages in the top and bottom halves between the transverse box-housings of the main bearings.

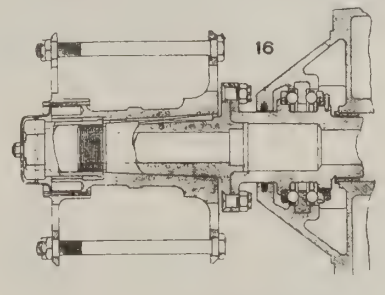
Oil Pump and Lubrication System

The oil pump is attached to the bottom half of the crankcase at the rear end, and driven by a worm gear off the rear end of the crankshaft through a short transverse layshaft. Most

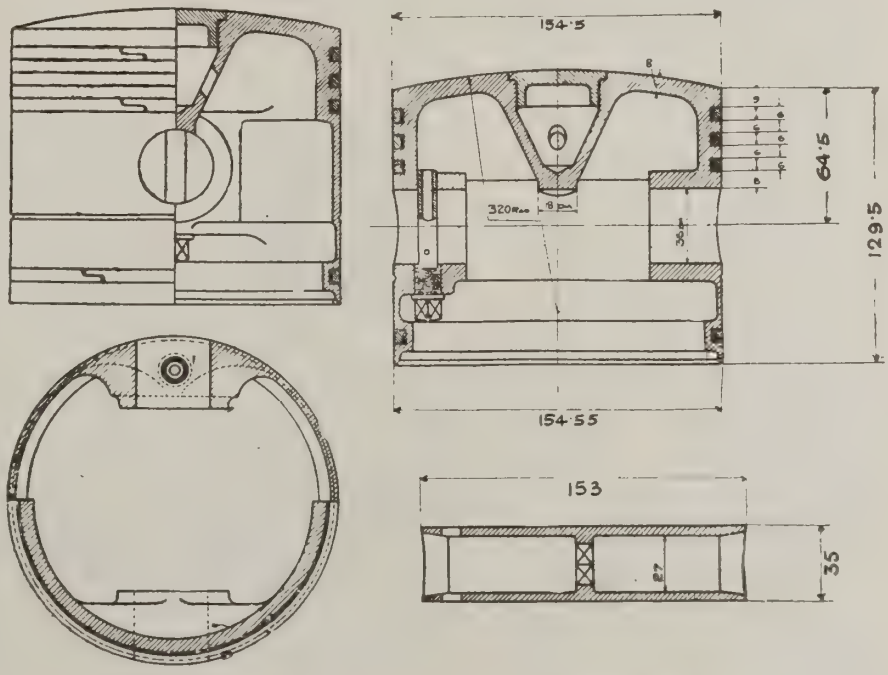


17. Details of connecting rod

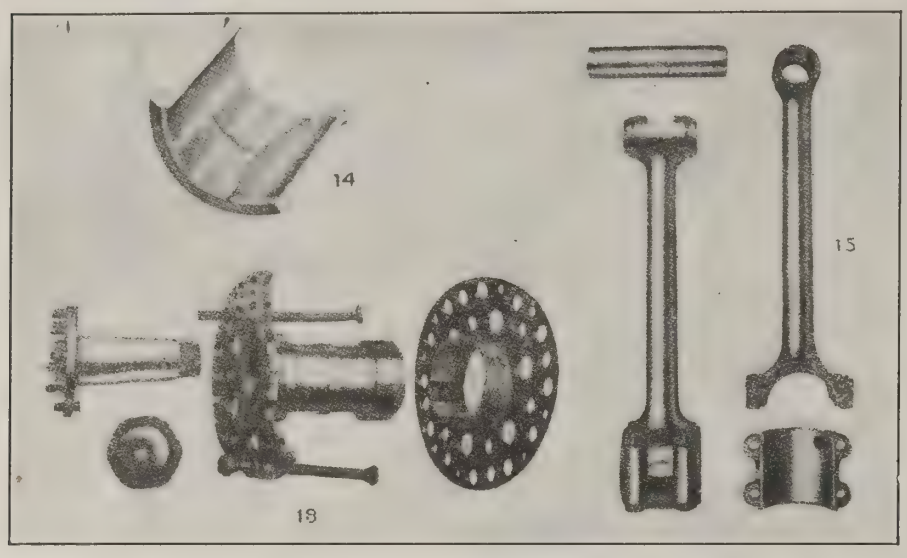
of the details of construction of the oil pump may be seen in the photograph of the pump, Fig. 23, which has been specially sectioned to show as much as possible of the various oil passages, ports and connections. The pump consists of two double-acting steel plungers, which work vertically in the barrels formed in the ends of the cast aluminium pump body. In action, the plungers are rotated by means of the worm gear, and are simultaneously reciprocated by the action of the scroll-cam cut in the spindle (Fig. 24), and operated by a hardened steel roller working on a pin screwed into the pump body. At every stroke of the two double-acting plungers, oil is drawn from the cooler tank and sumps in the base chamber, and is delivered to the main bearings and camshaft or returned to the oil cooler respectively, through the four distributing ports in the pump plungers. These ports when in action coincide with the drilled passages in the body casting of the oil



16. Section of propeller hub and thrust race



12. Details of pistons and the gudgeon pin



14. Sketch of big end bearing lining. 15. Connecting rods. 18. Propeller hub and detachable extension piece

pump, which are connected to the various leads as shown in the lubrication diagram, Fig. 25.

The functions of the oil pumps and circuits are as follows:

1. *Main Pressure Circuit,* by the two inner pumps to crankshaft and connecting rod bearings and also to the hollow camshaft, returning by gravity to the two sumps at either end of the base chamber. The oil for this circuit is drawn from the supplementary oil cooler tank, which is replenished by fresh oil from the service oil tank.

2. *Scavenger Circuit.*—Oil is drawn by the two outer pumps from the two oil sumps in the bottom of the base chamber, and is returned to the oil cooler.

The total weight of the oil pump complete is 5.0 lbs. No details can be given of the construction of the water or air pumps, which were missing from the engine examined. The water pump, however, was evidently driven by the short transverse shaft which drives the oil pump at the rear end of the engine. This shaft is situated directly underneath the floating distribution bevel gear on the rear end of the crankshaft, as shown in the general arrangement drawing of the engine, Fig. 26, in which the oil pump, for the sake of clearness, is drawn on the exhaust side of the engine. The air pump, which was driven by a small crank fixed in the front end of the camshaft, was probably similar in design to the 260 h.p. Mercedes, and is shown thus in the general arrangement.

Ignition

Ignition is by two Z.H. 6 magnetos, which are driven obliquely to the crankshaft axis by bevel gears off the camshaft driving spindle at the rear end of the engine.

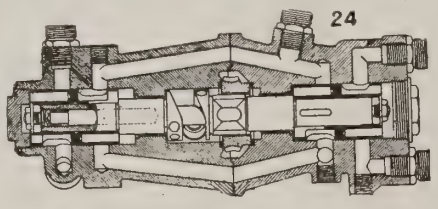
Two Bosch 3-point plugs are fitted to each cylinder, and are situated just below the induction valves. Provision is also made for fitting one sparking plug on the exhaust side of the cylinders, the holes not in use being plugged.

The H.T. cables are carried in fibre tubes attached to the cylinders.

The machine-gun interrupter-gear triple drive is bolted to the camshaft bevel gear case, and is driven off the rear end of the camshaft as shown in Fig. 2. The wireless dynamo is driven off the rear end of the crankshaft by a standard type of friction-clutch belt pulley described in a previous report.

General Analysis of Weights

Description of Part.	No. per Set.	Average Unit Wt. lbs.	Wt. of Complete Set. lbs.	Percentage of Total Wt.
Cylinders (bare)	6	35.67	214.05	24.20
Pistons, with rings...	6	5.18	31.12	3.51
Gudgeon pins	6	1.00	6.00	0.68
Connecting rods.....	6	9.00	54.00	6.10
Crankshaft	1	138.50	138.50	15.65
Inlet valves.....	12	0.50	6.00	0.68
Exhaust valves.....	12	0.50	6.00	0.68
Inlet and exhaust valve springs.....	24	0.25	6.00	0.68
Valve collars and locking nuts.....	24	0.03	0.74	0.08
Valve rockers, with bearings	12	1.43	17.22	1.94
Camshaft, with bearings	1	18.75	18.75	2.12
Camshaft tappets.....	12	0.31	3.75	0.42
Camshaft casing, with air pump and rev. counter drive.....	1	35.77	35.77	4.04
Vertical shaft driving spindle	1	4.50	4.50	0.51
Ditto, casing.....	1	2.30	2.30	0.26
Crankcase (top half).	1	97.50	97.50	11.00
Crankcase (bot. half).	1	112.00	112.00	12.67



24. Section of oil pump

Propeller hub, complete	1	29.43	29.43	3.33
Carburetors	2	2.00	4.00	0.45
Induction pipes.....	2	2.00	4.00	0.45
Oil pump	1	5.00	5.00	0.56
Oil leads	1	4.56	4.56	0.51
Magnetos	2	14.37	28.75	3.25
High tension leads and case	2	2.12	4.24	0.48
*Water pump (estimated)	1	8.00	8.00	0.90
*Exhaust manifold (estimated)	1	15.00	15.00	1.70
Miscellaneous parts...	1	27.82	27.82	3.15
Total.....			885.00	100.00

General Data

Type number, No. 550; number and arrangement of cylinders, six, vertical; bore, 155.0 mm. (6.10 in.); stroke, 200.0 mm. (7.87 in.); stroke/bore ratio, 1.29:1; area of one piston, 188.7 sq. cm. (29.24 sq. in.); total piston area of engine, 1132.2 sq. cm. (175.44 sq. in.); stroke volume of one cylinder, 3774.0 cub. cm. (230.21 cub. in.); total stroke volume of engine, 22644.0 cub. cm. (1381.28 cub. in.); clearance volume of cylinder, 1130 cub. cm. (68.96 cub. in.); compression ratio (approximate), *4.34:1; normal b.h.p. at 1,400 r.p.m., *269 b.h.p.; maximum b.h.p. at 1,600 r.p.m., *302 b.h.p.; direction of rotation of crankshaft and propeller, r.h.t.; type of valve gear, overhead camshaft; type of starting gear, compression release; weight of complete engine, dry, *885 lbs.; weight per normal b.h.p., ditto, *3.29 lbs.

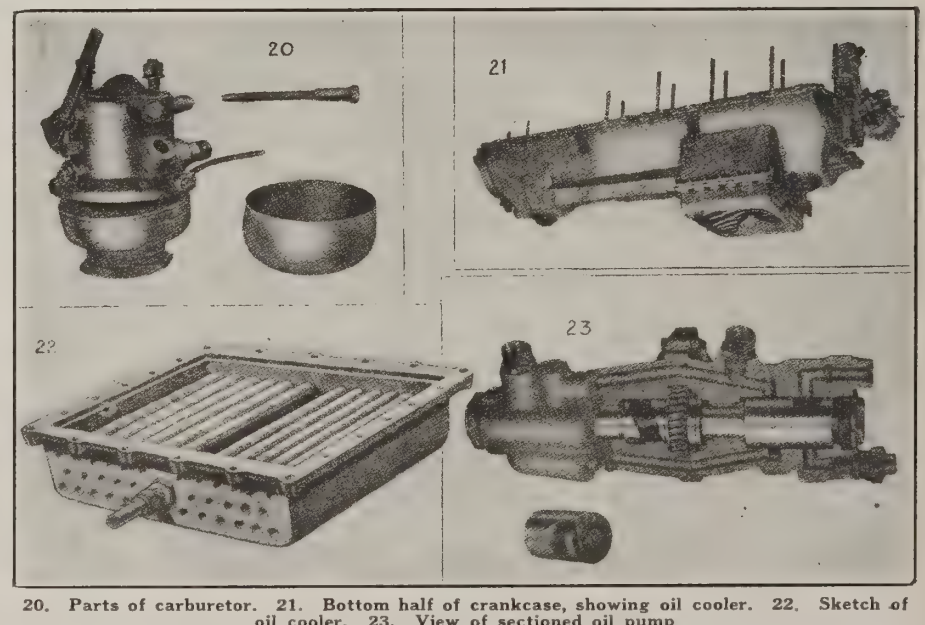
Carburetors.—Number and type of carburetors, two, 2 jets; diameter of choke tube, 50.0 mm. (1.96 in.); bore of main jets, 2.59 mm. (0.0102 in.); bore of pilot jets, 1.17 mm. (0.0046 in.).

Valve Areas, Gas Velocities, etc.—Diameters—Induction pipe, 58.0 mm. (2.28 in.); inlet and exhaust effective valve ports (each), 56.0 mm. (2.20 in.). Cross sectional areas—Induction pipes, 26.4 sq. cm. (4.10 sq. in.); inlet valve (π dh) and exhaust valve (π dh) (each), 17.6 sq. cm. (2.72 sq. in.).

Mean Gas Velocities (1,400 *r.p.m.*).—Piston speed, *1,837 ft. per min.; induction pipe, *219 ft. per sec.; inlet valve, *164 ft. per sec.; exhaust valve, *164 ft. per sec.

Inlet and Exhaust Valves.—Number per cylinder (each), two; largest diameter, 61.0 mm. (2.40 in.); effective valve port diameter, 56.0 mm. (2.20 in.); angle of seating, 45 deg.; lift of valve, 10.0 mm. (0.39 in.); diameter of stem, 11.0 mm. (0.43 in.); length of valve guide, 90.0 mm. (3.54 in.); overall length of valve, 146.0 mm. (5.74 in.); number of springs per valve, one; free length of spring, 80.0 mm. (3.14 in.); length of spring in position (no lift), inlet, 58.0 mm (2.28 in.); length of spring in position (no lift), exhaust, 55.0 mm. (2.16 in.); mean diameter of coils (top), 36.0 mm. (1.41 in.); mean diameter of coils (bottom), 28.0 mm. (1.10 in.); diameter of wire, 4.0 mm. (0.157 in.); ratio, length of spring/lift of valve (inlet), 5.8:1; ratio, length of spring/lift of valve (exhaust), 5.5:1; weight of valve complete with spring, 0.75 lb.; weight of spring, 0.25 lb.

Inertia Forces, Bearing Loads, etc.—Weight of piston, complete with rings and gudgeon pin, 6.187 lbs.; weight per sq. in. of piston area, 0.211 lb.; weight of connecting rod, complete, 9.00 lbs; weight of reciprocating part of connecting rod, 2.25 lbs.; total reciprocating weight per cylinder, 8.437 lbs.; weight per sq. in. of piston area, 0.288.; length of connecting rod (centers), 360.0 mm. (14.17 in.); ratio, connecting rod/crank throw, 3.6:1; inertia lbs./sq. in. piston area: Top center, 80.7 lbs. sq. in.; bottom center, 45.7 lbs. sq. in.; mean, 31.6 lbs. sq. in.; weight of rotating mass of connecting rod, 6.75 lbs.; total centrifugal pressure, 1,480 lbs.; centrifugal pressure, lbs./sq. in. piston area, 50.7 lbs. sq. in.; mean average fluid pressure, including compression, 44 lbs. sq. in.; mean average loading on crankpin bearing, total from all sources in terms of lbs./sq. in. piston area, 115.7 lbs. sq. in.: diameter of crankpin, 70.0 mm. (2.75 in.); rubbing velocity, 16.8 ft. per sec.; effective projected area of big-end bearing, 53.9



20. Parts of carburetor. 21. Bottom half of crankcase, showing oil cooler. 22. Sketch of oil cooler. 23. View of sectioned oil pump

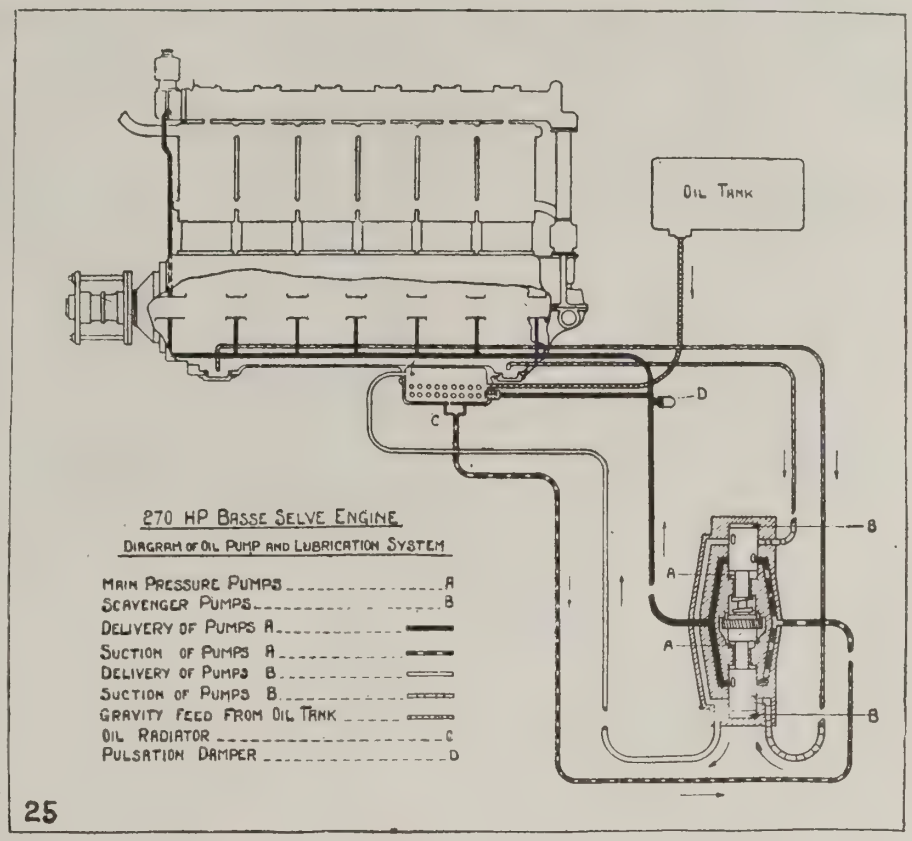
sq. cm. (8.35 sq. in.); ratio, piston area/projected area of big-end bearing, 3.50:1; mean average loading on big-end bearing, 405 lbs. sq. in.; load factor on big-end bearing, 6,800 lbs. ft.-sec.

Cylinders.—Depth of spigot at base of cylinder, 8.0 mm. (0.31 in.); thickness of flange at base of cylinder, 10.0 mm. (0.39 in.); number of holding-down studs per cylinder, six; diameter of holding-down studs, four of 16.0 mm., two of 14.0 mm.; thickness of water-jacket, 1.0 mm. (0.039 in.); mean thickness of combustion chamber wall, 7.0 mm. (0.27 in.); mean thickness of cylinder barrel, 3.0 mm. (0.118 in.). .. ..

Piston.—Types of piston, aluminium (convex crown); diameter of top, 154.5 mm. (6.08 in.); diameter of bottom, 154.75 mm. (6.09 in.); length, 130.0 mm. (5.11 in.); ratio, piston length/cylinder bore, 0.838:1; number of rings per piston, four; position of rings, three above pin, one below; width of rings, 6.0 mm. (0.23 in.); type of joint in rings, stepped.

Connecting Rod.—Length between centers, 360 mm. (14.17 in.); ratio, connecting/crank throw, 3.6:1; little-end bearing, type, phosphor bronze; little-end bearing, diameter, 35.0 mm. (1.37 in.); little-end bearing, length, 80.0 mm. (3.14 in.); little-end bearing, projected area, 28.0 sq. cm. (4.34 sq. in.); ratio, piston area/projected area of little-end bearing, 6.74:1; big-end bearing, type, bronze shell lined white metal; big-end bearing, diameter, 70.0 mm. (2.75 in.); big-end bearing, length effective). 77.0 mm. (3.03 in.); big-end bearing, projected area, 53.9 sq. cm. (8.35 sq. in.); ratio, piston area/projected area of big-end bearing, 3.50:1; number of big-end bolts, four; full diameter of bolts, 12.0 mm. (0.47 in.); total cross-sectional area bottom of threads (0.460 sq. in.); pitch of threads, 1.75 mm.; weight of big-end cap, with two bolts and bearing shell, 2.562 lbs.; total load on bolts at 1,400 r.p.m., 3,460 lbs.; total load on bolts at 1,600 r.p.m., 4,530 lbs.; stress per sq. in. at 1,400 r.p.m., 7,500 lbs. sq. in.; stress per sq. in. at 1,600 r.p.m., 9,850 lbs. sq. in.

Crankshaft.—Number and type of main bearings, seven bronze shell lined white metal; cylinder centers, 210.0 mm. (8.26 in.). Crankpins: Outside diameter, 70.0 mm. (2.75 in.); inside diameter, 40.0 mm. (1.57 in.); length, 85.0 mm. (3.34 in.). Journals: Outside diameter, 70.0 mm. (2.75 in.); inside diameter, 40.0 mm. (1.57 in.); length (propeller end), 60.0 mm. (2.36 in.); length (rear end), 90.0 mm. (3.74 m.); length (intermediate), 63.0 mm. (2.48 in.). Webs: Width, 84.0 mm. (3.30 in.); thickness (front one), 37.0 mm. (1.45 in.); thickness (others), 31.0 mm. (1.22 in.). Radius at ends of crankpins and journals, 4.0 mm. (0.158 in.); weight of complete shaft, 138.5 lbs.; length of complete shaft, 820 mm. (38.28 in.).

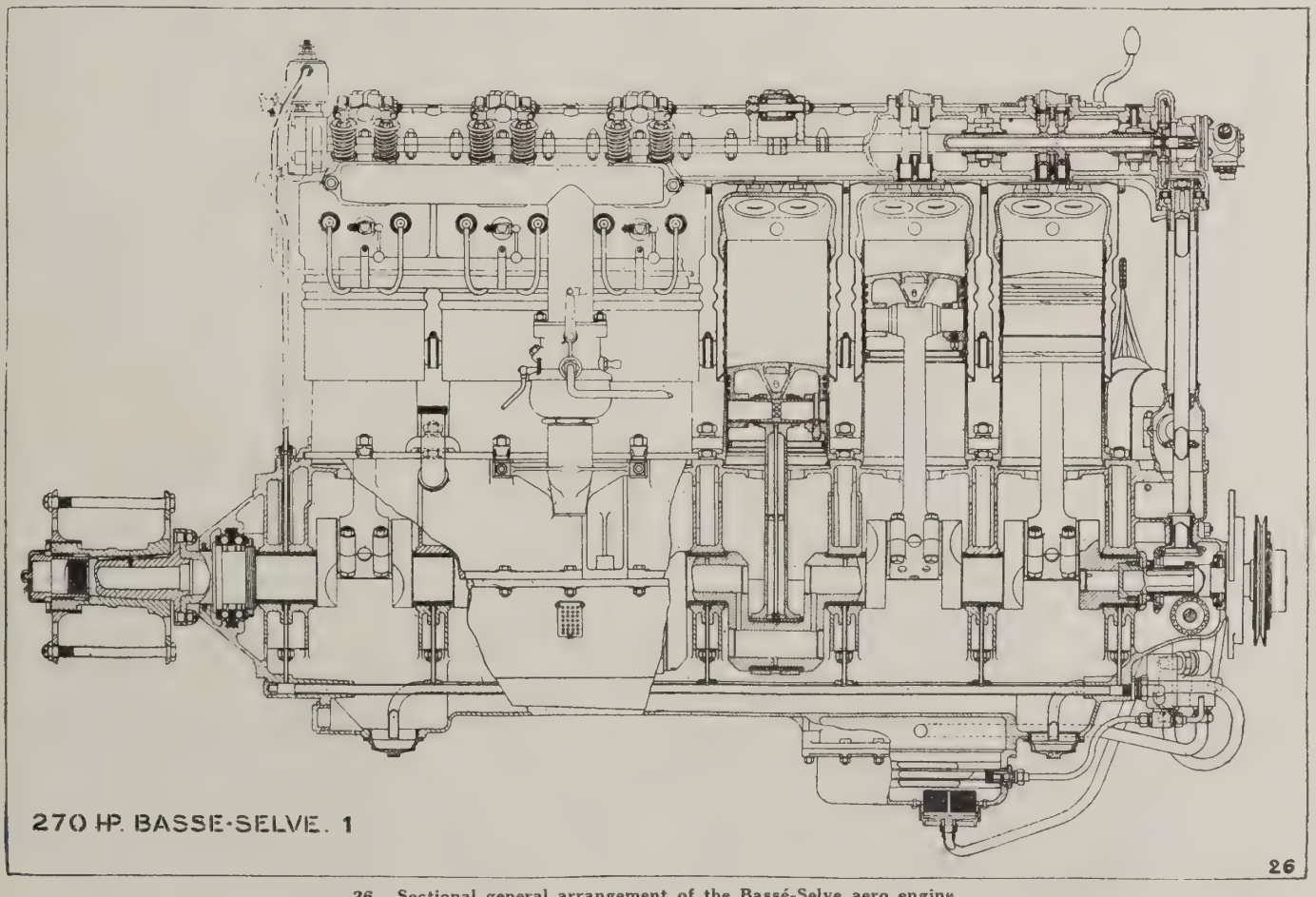


25. Lubrication diagram

Ignition.—Number and type of magnetos, two, Bosch Z.H.6; firing sequence of engines prop. 1, 5, 3, 6, 2, 4; number of plugs per cylinder, two; type of plugs, Bosch three-point; ratio, magneto speed/engine speed, 1.5:1.

Lubrication.—Number and type of oil pumps, one, duplex (double-acting); bore, 45.0 mm. (1.77 in.); stroke, 12.0 mm. (0.47 in.).

(*Continued on page 262*)



26. Sectional general arrangement of the Bassé-Selve aero engine

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Olcott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in the order named.
Note 2—Report to Aviation General Supply Depot, Detroit, Mich.
Note 3—Report to Chief of Aeronautical Engineering Division, Dayton, Ohio.
Note 4—Report to Fort Logan, Colorado.
Note 5—Report to Aviation Supply Depot, Little Rock, Arkansas.
Note 6—Report to Consumers Building, Chicago, Illinois.
Note 7—Report to Emerson Field, Camp Jackson, Columbia, S. C.
Note 8—Report to Department Air Service Officer, 104 Broad Street, New York City, N. Y.
Note 9—Report to General Hospital No. 32, Chicago, Illinois.
Note 10—Report to Aberdeen Proving Ground, Aberdeen, Md., to 271st Aero Squadron.
Note 11—Report to Walter Reed Hospital, Tacoma Park, Washington, D. C.
Note 12—Report to 302 Broadway, New York City, for temporary duty.
Note 13—Report to Washington, D. C., to Director of Air Service for duty.
Note 14—Report to Fort Porter, N. Y., to commanding officer.
Note 15—Report to U. S. Army General Hospital, Cooperstown, N. Y.

Special Orders 68-75 Inclusive

A
Andrew, Flynn L. A.....Note 4
Armstrong, Walter.....DAP
Anderson, Samuel H.....Note 3

B
Brown, Orlo W.....DAP
Boggs, Marshall S.....EOT
Berry, Norman K.....DAP
Branson, Raymond L.....DAP
Borre, Peter C.....DAP
Blair, Bert R.....Note 13

C
Cleary, Maurice G.....HHN
Callahan, Laurence K.....Note 9
Cundiff, Lawrence B.....LHV
Chadbourn, Philip H.....Note 12
Clark, Wallace T.....SAG
Carolin, Norbert.....Note 10
Clare, Wilfred M.....LHV
Collier, David C., Jr.....Note 7
Coan, U. Samuel.....AGC
Chandler, William H..Note 5; Note 3; Note 1
Carroll, Mitchell B.....HHN

D
Day, Oswald N.....DAP
Dickinson, Raymond S.....Note 3

E
Ellis, Robert H.....Note 13

F
Floyd, Ralf A.....Note 15
Foster, Neville C.....Note 14

G
Gray, Washington Malcolm.....Note 8
Gregory, Joseph V. C.....Note 15
Gray, Will K.....Note 15

H
Huffman, William E.....ABC
Hill, Robert E.....Note 13
Harper, Earle G.....DAP
Hamilton, Mark A.....Note 13

I
Irwin, John R.....WFO

J
Jordan, William J.....DAP

L
Long, Bartlett G.....CJW
Larned, Elmer.....Note 6
Logan, Patrick H.....Note 13
Lyon, Alfred J.....Note 3

Mc
McCoy, Clayton Lloyd.....Note 11
McCullough, Charles E.....ABC

M
Maenner Theodore H.....DAP
Miller, Clarence L.....Note 14
Marquette, John Jerome.....DAP

N
Niergarth, Omer O.....DAP

P
Pross, Edwin C.....AGC
Page, Richard M.....AGC

R
Redman, Mark H.....WFO
Rorick, Estell H.....Note 13

S
Smith, Dean.....Note 3
Struthers, Parke H.....DAP
Schneider, Max F.....EOT

T
Tisdale, Roy P.....Note 5
Turpin, Paul R.....SAG

W
Wilson, Franke Henry.....Note 2
Williams, Chauncey B.....DAP

Recent Naval Orders

Lieutenant (junior grade) Arthur P. Teulon, to duty Navy Air Station, Key West, Fla.

Lieutenant (junior grade) Louis A. Peterson, to duty Navy Air Station, Hampton Roads, Va.

Lieutenant (junior grade) Clarence A. Hawkins, to Brunswick, Ga., Naval Air Station, for duty.

Lieutenant (junior grade) A. S. Williams, to duty Navy Air Station, Key West, Fla.

Lieutenant (junior grade) A. W. Hawkins, to duty Naval Air Station, Rockaway Beach, L. I., New York.

Lieutenant Commander Victor D. Herbster, to Queenstown for duty as commander Air Station, Ireland.

Demobilization of Air Service Personnel Overseas Increasing

During the two weeks from February 27 to March 13 the strength of the Air Service overseas decreased 5,140 men against 4,440 during the previous four weeks. The strength of the Air Service in the United States and overseas is shown for various dates in the following diagram:

	In U. S.	Overseas
Nov. 11	111,846	78,786
Dec. 2	115,216	78,061
Dec. 26	99,010	59,917
Jan. 30	46,919	57,527
Feb. 27	33,649	53,087
Mar. 6	33,068	50,763
Mar. 13	33,331	47,947

Progress in Demobilization

According to reports received from the Air Service the net decrease in the total commissioned and enlisted strength from the date of the armistice to March 13 was 57 per cent.

The following table shows the distribution and per cent. of net decrease to March 13. The strength figures include only officers and men not yet ordered discharged; they do not include men at demobilization camps awaiting discharge.

	Nov. 11	Mar. 13	Per cent net decrease
Cadets	5,775	1,187	79
Officers	20,586	7,631	63
Enlisted men	164,266	72,460	56
Total	190,527	81,278	57

Officers for Air Service May Be Drawn from Infantry and Artillery

War Department circular No. 148 recently made public outlines of the plans of the War Department with reference to the retention in the service of officers who expressed their desire to remain in the permanent establishment. Such officers are particularly urged to reconsider their decision, particularly those who are fitted only for staff duty. This includes officers of the Air Service. The circular states that the present system of filling vacancies in the staff corps by temporary details from the line officers—that is, Cavalry, Field Artillery, Coast Artillery, Infantry, Engineers or Medical Department—may or may not be continued.

The War Department authorizes publication of the following circular:

Circular No. 148.

War Department,
Washington, March 27, 1919.

Information as to Retention in the Service of Officers Placed in Class Three

1. At the beginning of demobilization instructions were issued dividing emergency officers into classes according to their desires and suitability for future service. Officers of the third class were those officers desiring and found qualified for future appointment in the Regular Army, should legislation provide an increase in the permanent establishment. This is to be the last class of officers discharged. Subsequently boards of officers were convened wherever possible to determine the suitability of class three emergency officers for retention with a view to appointment in the permanent establishment. . . .

4. As no legislation concerning the permanent establishment has been enacted, and as there appears to be no prospect of any such legislation in the immediate future, many matters pertaining to the future appointment of class three officers in the permanent establishment are still in doubt. The election of an officer to remain in class three is a matter of considerable importance to the individual and each officer is advised to consider fully the following matters in arriving at his decision whether to continue as a class three officer or request reclassification with a view to discharge when his services can be spared:

(a) In the classification of an officer there is no promise expressed or implied that he will receive a future appointment in the permanent establishment. It is the hope of the War Department that such officers will be made a preferred class in filling such vacancies, if any, as future legislation may provide.

(b) The appointment of such officers in the permanent establishment must be subject to their eligibility under such legislation as may hereafter be enacted. Examinations for appointment in the past have been academic as well as practical in order to establish the ability of the appointee to meet the requirements of the military service in the matter of professional education and improvement.

(c) The present system of commissioning all officers in the Cavalry, Field Artillery, Coast Artillery, Infantry, Engineers or Medical Department and the filling of vacancies in other staff corps by a temporary detail from time to time of officers of the above branches (Medical Department excepted) may or may not be continued. An officer who has been found suitable for appointment in one of the above branches or for appointment in either one of the above branches or a staff corps has therefore a much greater chance of appointment than an officer who has been found suitable for appointment in the staff corps only.

(d) In the absence of legislation should the number of class three officers in service become in excess of the number required for duty, the discharge of surplus class three officers will in the interests of economy become necessary. Should such officers be discharged, their applications if they so desire will be retained on file for consideration should future legislation provide vacancies to be filled in the permanent establishment.

(e) During the emergency officers have, in general, been advanced to grades above those which they could expect to hold under normal conditions and a general reduction in grade of class three officers upon entering the permanent establishment therefore appears probable. Regulations governing the grade to which officers are to be appointed and their realtive rank in such grade have not been and cannot be formulated until legislation authorizing appointments is enacted. While due credit will be given for service rendered during the war, officers cannot expect to retain the grades attained by them under war conditions. . . .

PEYTON C. MARCH,
General, Chief of Staff.

Official:
J. T. KERR,
Adjutant General.



Lieut. Manning, U. S. M. C., one of the judges, congratulating Lieut. Benjamin Reisweber on winning the stunt flying contest at the Miami Mid-Winter Regatta

Brig. Gen. Wm. Mitchell Decorated

Washington, D. C.—Brigidier General William Mitchell, chief of operations, United States Air Service, has been awarded the decoration of Companion, of the British Order of St. Michael and St. George. This is the fourth decoration awarded General Mitchell. He has received a Croix de Guerre, with a star and two palms designating subsequent citations, the decoration of Commander of the Legion of Honor, and the American Distinguished Service Cross.

The decoration was presented to General Mitchell by Lord Reading, British Ambassador to the United States at Washington. At the same time Lord Reading presented General March with the Knight's Grand Cross of this order.

Distinguished Service Medal for Officers and Civilians Who Aided Aeronautic Development

Colonel James G. Steese, Corps of Engineers, U. S. Army. For exceptionally meritorious and conspicuous service. As Assistant to the Chief of Engineers and in charge of the personnel, equipment, construction and maps divisions of the Office of the Chief of Engineers he displayed exceptional ability in handling commissioned personnel matters and developed special apparatus and methods for the production of aerial navigation maps. Since September, 1918, the solution of the many difficult problems in the organization and operation of the Personnel Branch, General Staff, has been due largely to his special knowledge of personnel matters, his untiring zeal, good judgment and administrative ability.

Brigadier General Charles McK. Saltzman, U. S. Army. For exceptionally meritorious and conspicuous service. While assigned to duty in the Air Service, he voluntarily undertook and successfully accomplished the difficult task in the face of many obstacles of preparing an organization for the procurement and supply of the Signal Corps equipment.

Mr. Frank B. Jewett, late Lieutenant Colonel, Signal Corps. For exceptionally meritorious and conspicuous service in connection with the development of the radio telephone and the development and production of other technical apparatus for the Army.

2nd Anti-Aircraft Battalion Cited

Washington, D. C.—A letter from the Chief of the Anti-Aircraft Service, A. E. F., reveals the record of the 2nd Anti-Aircraft Machine Gun Battalion as having downed 17 enemy aeroplanes in one and a half months. The letter is as follows:

"Headquarters, Anti-Aircraft Service, First Army, A. E. F.
"16th January, 1919.

"From: Commanding Officer.
"To: C. O., 2nd Anti-Aircraft Machine Gun Battalion.
"Subject: Service in Meuse-Argonne Offensive.

"This is to bear witness to the valuable service performed by the 2nd Anti-Aircraft Machine Gun Battalion during the trying times of the Meuse-Argonne offensive. The units of this command, scattered along the front of three American corps attacking the strong German lines, many times found themselves in the very front lines and always conducted themselves, during their comparatively long period of front line work under frequent shell fire, in a most creditable manner.

"The record of seventeen enemy aeroplanes shot down by the battalion in the average period of one and a half months has not been equalled by any other organization, American or Allied, so far as the writer has been able to determine.

"Words of praise from any one cannot add to the record, which is an ineradicable evidence of faithful devotion to duty on the part of every member of the command.

"This letter will be read to each organization at its next formation after its receipt and a true copy should be furnished to all who desire one.

(Signed) "R. W. COLLINS,
"Colonel Coast Artillery Corps,
"Chief Anti-Aircraft Service,
"First Army, A. E. F."

Air Service Wants Men

In a statement issued from the office of the Air Service Officer, Headquarters, Eastern Department, U. S. Army, at 105 Broad Street, an appeal is made for recruits. The statement, signed by Major J. McClintock, U. S. A., declares that if flying is to continue in the American Army men now experienced in that branch of the service must re-enlist. Under the reorganization plans of Major General Charles T. Menoher, head of the Air Service, authority has been granted by the General Staff to enlist 15,000 men.

"At the present time," says the Air Service statement, "enlisted men constituting the Air Service forces are men who have been in for the period of the war, and most of them desire to sever their connection with the army. It is thought that from among this number who desire to get out of the service, if the proper inducements that the Air Service is able to give were presented to them in the right light, they could be induced to stay in for a period of one year.

"It is possible at this time for these men to take their discharge, receive the $60 that is allowed each discharged man, re-enlist in the Air Service for one year, then to be given one month's furlough, and in most cases it will be perfectly possible for that man to retain the non-commissioned grade that he has attained, and upon his re-enlistment, in addition to the $60 allowed each discharged man, be allowed five cents per mile to his home. Inasmuch as he can obtain a one-cent-a-mile rate when going on a furlough, and return to his proper station, he can save from this amount a certain nominal sum.

"For men who have had service in the Army it is believed that that is a decided advantage for the period of one year enlistment or until labor conditions have become more stable, at which time they can expect more positive market for their service in civilian life."

FOREIGN NEWS

French Assist in Development of Japanese Air Service

Tokyo.—Seventeen officers and twenty men of the French air forces, headed by Colonel Faure, have arrived in Japan to supervise the reorganization of the Japanese air service. The mission comes in fulfillment of a promise made by the French government to the Japanese war ministry during the war that such assistance would be given as soon as possible after the cessation of hostilities.

The French government is sending one hundred aeroplanes to Japan to be used in the reorganization work. It is expected that the visiting aviators will be here three months. They have been given a very hearty reception by Japanese officials, and French flags are crossed with Rising Suns throughout Tokyo in their honor.

The officers are all veterans of the air, and each wears several decorations and ribbons indicating his service for France and for the Allies. One of the members of the mission, Lieut. Georges Richardson, fought with the United States marines last year, having been assigned to duty as a liaison officer. Commandant Lefevre, who downed a Zeppelin on its return from a bombing expedition to London, is a member. Some of the officers have seen service on all battle fronts.

King Albert Flies from Brussels to Paris

Paris.—Albert, King of the Belgians, who arrived in Paris from Brussels by aeroplane, came, according to the *Intransigeant*, to plead the cause of Brussels as the seat of the League of Nations.

King Albert reached an aviation camp near Paris soon after noon.

London to Paris in Eighty Minutes

London.—A new air record between London and Paris was established on March 28th when a De Haviland machine of the official communication squadron, used by the Peace Conference delegates, flew the two hundred and fifty miles in eighty minutes.

740 Cross-Channel Passengers Carried Without Accident

In connection with the cross-channel ferry service, it was learned that 740 officials had been carried to and from the Peace Conference without accident.

Five Passengers Climb 20,340 Feet in Goliath Plane

Paris.—A Goliath aeroplane, carrying five passengers, has reached an altitude of 6,200 metres (about four miles). The climbing occupied one hour and fifteen minutes and set a new record by several hundred metres for this kind of flight.

British "Mystery" Plane Described

It is stated that plans for the new mystery aircraft to which Major-General Seely referred in the House of Commons last week have already been drafted, and experiments have begun. The Government is not building the new type; that is being left to a private firm in co-operation with the Air Ministry. It will be a tailless machine, a square in appearance, with two planes in front and two planes of the same dimensions behind. These planes are connected fore and aft by lattice frames, below which are swung enclosed Pullman cars for passengers and crew. Two, three, or possibly more cars will be carried between the front and rear planes. In the machine with three cars the crew will occupy the center one, the two on either side being left for passengrs or cargo. Rudders will be on the upper rear plane. The possibilities of the new type are considered to be such that a machine could be engined up to almost any power. A speed of 200 miles an hour would easily be attained. It is believed that the new machine can be made so stable in the air as almost to fly itself. When coming to earth it will be able to "pancake" down almost vertically and quite slowly.

French Government Aids Aircraft Industry

With a view to stimulating activity among French aeroplane constructors, the Military Aeronautic Department is organizing an exhibition of commercial aeroplanes, seaplanes, and airships.

Dutch Will Hold Aero Exposition at Amsterdam

The first Dutch exhibition devoted to aerial traffic is to be held at Amsterdam from July 5th to July 28th. The honorary president is M. Colyn, Senator and Ex-Minister of War. Great Britain and France will be represented at the exhibition, and efforts will be made to arrange an aerial service from Amsterdam to London.

Honolulu to Hilo Service Started

Honolulu.—An army aeroplane carried four persons from Honolulu to Hilo recently, the first successful trip. They averaged a mile a minute, and returned the same afternoon.

Pershing Awards D. S. M. to Allied Aeronautical Officers

Chaumont, France.—General Pershing has awarded the Distinguished Service Medal to the following officers in the Allied Military Services for their work in connection with the Air Service:

Major D. V. G. Blake, C. O. 3rd Squadron, Australian Flying Corps.

Major C. G. Boyce, Attached as Staff Officer, Units of R. A. F., serving with 2nd U. S. Army Corps.

Major Filippo Molteni, Chief of Paris Section, Italian Foreign Military Aeronautical Mission.

Lieutenant Colonel B. R. Peal, in charge British Aviation Office at Paris.

Lieutenant Colonel P. H. L. Playfair, C. O., 13th Wing, R. A. F.

Major General Sir Hugh Montague Trenchard, K. C. B., D. S. O., Chief of Air Staff.

Norway Arranging an Aeronautical Exposition

An international aeronautic exposition is being arranged in Norway to be held next summer at Kjell. Prominent French and British aeronautical houses have been invited to exhibit their planes.

Australians Have Mapped Route to London; Flight for July

A Melbourne telegram says that with reference to the London Aerial League's request for Commonwealth co-operation in the flight to Australia, Lloyd cabled on January 9th, stating that his Australian company has a complete charting of Australian landing places. In July they will carry out at their own expense an experimental flight from Sydney to London.

Lloyd expects the Federal Government to recognize his claim to priority before subsidizing English private enterprise.

British Government to Settle Inventors' Claims

King George has approved the following appointments as members of a Royal Commission to determine what awards and royalties shall be paid to inventors in respect of the use of their inventions by Government Departments during the war: Mr. Justice Sargant, chairman; Halford J. Mackinder, Esq., M.P.; Robert Young, Esq., M.P.; Professor the Hon. R. J. Strutt, F.R.S.; Sir James J. Dobbie, F.R.S.; W. Temple Franks, Esq., C.B.; G. L. Barstow, Esq., C.B.; A. C. Cole, Esq.

Contest for Touring Planes in Italy

The National Aerial League of Milan is organizing a competition for small aeroplanes to carry light loads, specially designed for aerial touring, to be held in July at Taliedo.

Canada's First Air Squadron

An interesting statement was made at a meeting of the Liverpool branch of the Overseas Club, which was held at the Adelphi Hotel, by Mr. F. R. Jones, on the eve of his departure to Canada as the club's special commissioner. Apart from its other functions, said Mr. Jones, the club had been instrumental in raising £300,000 for the purchase of 172 aeroplanes, and the Canadian Club had provided the British Government with seven aeroplanes during the war. The Government has now promised to return to Canada seven aeroplanes, and, in addition, to make her a gift of eight other machines. Apart from this, Captain Simpson had given £1,500 for the purchase of one machine, which would be added to the others. These sixteen machines will be flown to Canada and will form the first air squadron of the Canadian Air Forces.

3,965 "Scrapped" Since the Armistice by Royal Air Force

General Seely, in written answers to Mr. Joynson-Hicks, states that the number of aeroplanes on charge at the date of the Armistice was 20,850, and the number of seaplanes was 1,248. Since then and up to the date of the last return 2,142 obsolete machines have been reduced to produce and in addition 1,823 machines of standard types which have been damaged and were not repairable have also been reduced. These figures include 2,460 which were reduced to produce in England. The disposal of aircraft surplus requirements is undertaken by the Ministry of Munitions.

Twelve machines of obsolete type were burned in France after removal of the engines and instruments. They had been damaged in landing at places where there were no facilities for reducing them to produce nor means for transporting them elsewhere, nor was there any possibility of selling them. There is no information regarding the use of petrol to assist in burning them.

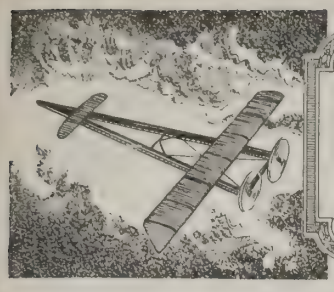
It is stated that a large number of new and second-hand R.A.F. aeroplanes, seaplanes, and flying boats are to be sold by the Aircraft Department, Ministry of Munitions, York House, Kingsway.



A French Caudron training plane

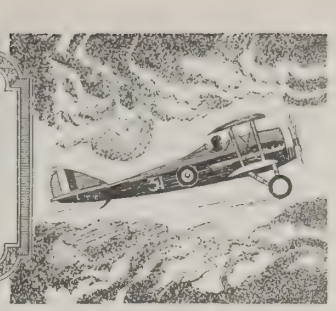
British Aircraft Insurance Profit of Ten Millions

Mr. Bridgeman, in a written reply to Mr. Kennedy Jones, who asked the Chancellor of the Exchequer if he would state what surplus moneys resulting from aircraft insurance were in the hands of the various insurance companies who, on behalf of the Government, effected aircraft insurance, and what were the intentions of the Government respecting such surplus, said: "The moneys resulting from aircraft insurance in the hands of the various insurance companies who, on behalf of the Government, effected aircraft insurance, are purely nominal, as they have been regularly paid over to the Government in monthly accounts in accordance with agreement. The excess of premium over payments, which amounts to over ten millions, has, of course, gone into the National Exchequer."



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

BAY RIDGE MODEL CLUB
6730 Ridge Boulevard, Bay Ridge, Brooklyn

INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana

BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.

TRIANGLE MODEL AERO CLUB
Baltimore, Md.

NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St.,
Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg.,
Indianapolis, Indiana

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

CAPITOL MODEL AERO CLUB
1726 M Street, N. W.,
Washington, D. C.

CORRESPONDENCE MODEL AERO CLUB
320 N. Main Street,
Rockford, Ills.

AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

A Ford Motor Rebuilt for Aeroplane Work

THE accompanying photos show a very neat piece of work in the form of a Ford motor for an aeroplane.

This motor was built by Mr. P. P. Belt, proprietor of Belt's Garage, of Fredonia, Kansas, and is to be used in the Ford motored aeroplane, which was recently described in these columns.

Mr. Belt built the motor according to the drawings furnished by the author, with an addition of a few very ingenious ideas of his own.

He has built many machines for his own enjoyment, pictures of one of his latest appearing in these columns recently, along with a Ford motor having a gear and sprocket reduction, which Mr. Belt used in a Curtiss pusher type.

In summing up Mr. Belt says: I am enclosing two photos of my latest development in the reconstruction of a Ford motor as an aeroplane power plant. Photo No. 1 shows the water circulating pump connected to the end of the camshaft, as well as the magneto fastened directly to the end of the crankshaft. The magneto base is welded to the crankcase, as shown. The oil pump gears can also be seen in the front of the engine just behind the propeller hub extension. The oil pump itself can be seen plainly in photo No. 2, as well as the bevel gear drive fastened to the end of the camshaft, and it is bracketed to the end of the crankcase.

The oil pan is brazed to the crankcase lower half and fitted with a light oil gauge. The cylinder head is planed down on the lower side that fastens to the cylinder block 3/16 of an inch, which increases the compression, makes the engine snappy and materially increases the power. The top of the cylinder head is planed as well, and a flat steel plate 3/32 inch thick is brazed to it. The cylinder head when finished weighs only 21 pounds.

All the intake and exhaust ports are enlarged as well as the valve seats and the valves. This allows free suction and exhaust of new and burnt gas. The standard Ford camshaft and timing is still used, as better results have been accomplished than when the motor was timed earlier or later.

The motor is bolted onto a testing stand which has 4 inch wood wheels to allow free movement forward when testing and permits a scale to be fitted between the stand and a fixed object so as to be able to correctly determine the correct thrust at all times. The analytical method of figuring thrust is by no means as accurate as the stand and scale method which Mr. Belt employs.

The motor was tested with a 6 foot diameter 4½ foot pitch propeller of his own make. Running at only 1,500 R.P.M., it gave a maximum of 250 and a minimum of 191 pounds thrust, which is considerable more than is needed to fly the Ford motored aeroplane recently described in this column. This performance checks out very nearly with figures that the writer has computed for a motor of his own.

This motor developing 250 pounds thrust on the scale would pull the Ford aeroplane which I described at a speed of between 70 and 75 M.P.H. The thrust developed would indicate that this motor is developing between 35 and 40 horse power, which is quite high.

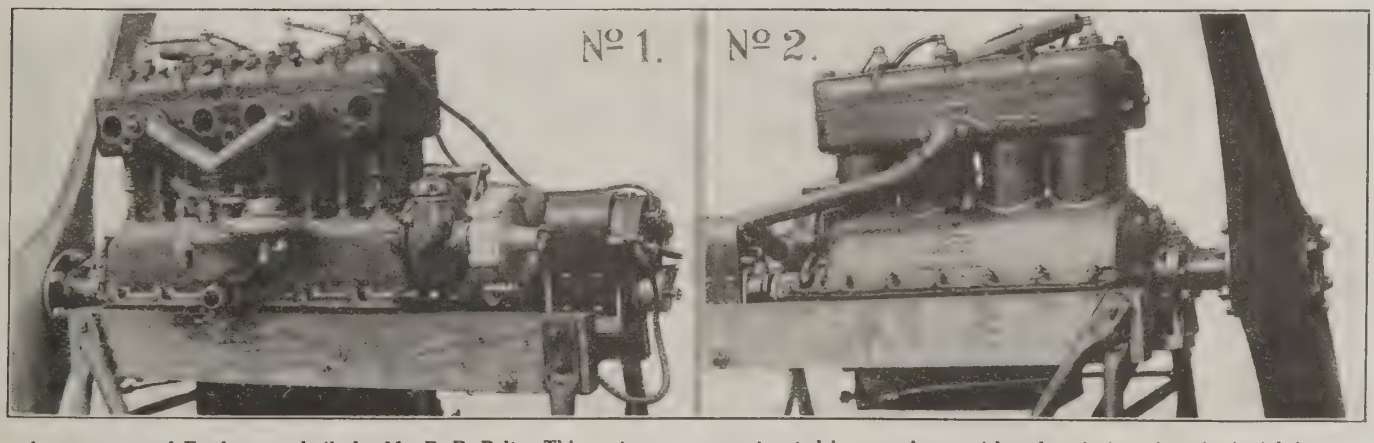
Mr. Belt promises to send photos of his machine when finished and also in flight.

New Club Organized

Mr. E. A. Jenkins, No. 1141 Bushwick Ave., Brooklyn, N. Y., who was recently membership secretary of the Correspondence Model Aero Club, until that club's disbandment, sends me notice that the old members of the Correspondence Model Club have organized a new one to be known as the Universal Model Aero Club.

The officers are as follows: President, Archibald D. Wellborn, Dallas, Texas; 1st Vice-President, Thomas F. Stanton, Babylon, N. Y.; 2nd Vice-President, Carl Fastje, Denison, Iowa; Secretary, Donald P. Simpson, Seattle, Wash.; Membership Secretary, Edwin A. Jenkins, No. 1141 Bushwick Ave., Brooklyn, N. Y. Canadian Representative, A. F. Adams, Montreal, Canada.

New members are wanted, and those wishing to join are referred to the membership secretary.



A reconstructed Ford motor built by Mr. P. P. Belt. This motor was reconstructed in accordance with a description given in Aerial Age



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

The Pilot

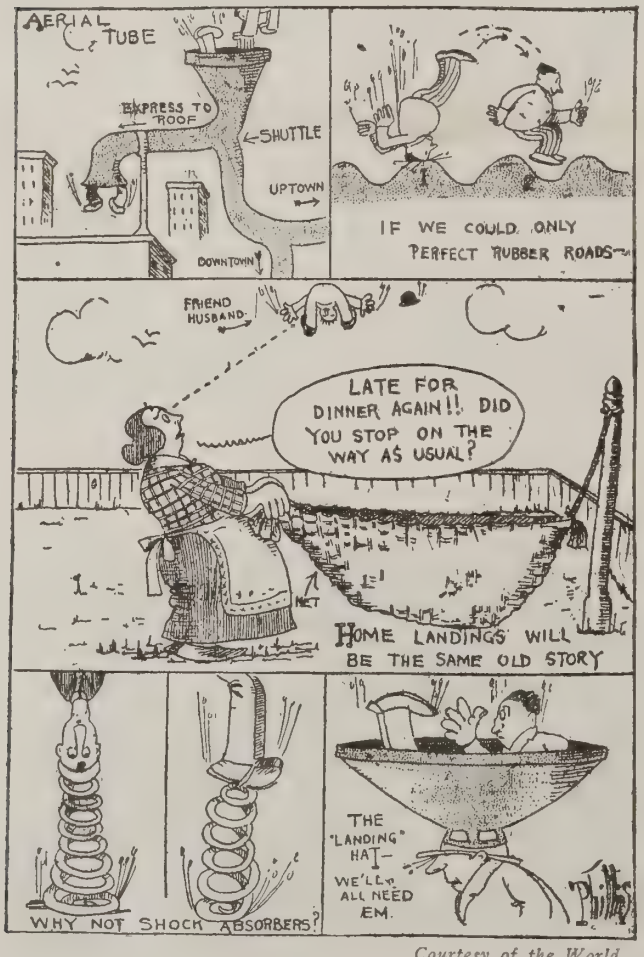
O little man, O great big wings,
O worlds that made a thousand things,
O cloudless skies, and vaulting blue,
Their wings of flight for you,—for you.

To soar to yonder heights and see
Thine own soul stretch to eternity;
Thy thoughts go on with white, white wings.
To worlds that say a thousand things.

Lift up your soul, O man of power;
Fling wide the portals; and guarded hour
High up, up, up, to heaven youth sings,
Transcending in beauty thy white, white wings.

January 12, 1919. R. V. W.

There's one happy thought about that air train service predicted by Dr. Alexander Graham Bell—it will not be delayed by cows on the track, washouts, snowslides or worn-out trackage.



Courtesy of the World

Aeroplane Landing Places

Owed to the Ships

(With apologies to R. K.)

I've flown my ships where I've found 'em,
And I've handled some wrecks in my time,
For some of those Kites were awful,
And a few that I've had were prime.
One was a streamlined spider,
And one with two eighty Le Rhones,
And one called a flaming coffin,
But it always carried me home.

Now, I ain't no judge of Coo Cooes,
For, takin' them all along,
You never can tell till you've tried 'em,
And some day you'll try one that's wrong.
There's times when I hoped to outrun 'em,
And there's times when I thought all was lost.
But the things that I've learned from the Fokkers
Have helped me a lot with a Pfalz.

When I first landed at Tours,
Anxious as —— to begin,
I met a G. 3. and a Frenchman—
To call it a ship was a sin.
Older than me, but my first one,
Anzani motored she were;
You carried her tail on the joy-stick,
But I learned about flying from her.

Then I went on the Nieuports,
At Issoudun, 3rd A. I. C.,
To fight the cheval on the take-off,
And to try to land on the "T."
There were doubles, and singles, and eighteens,
And the baby fifteen—a gem—
And stunts most thrilling, promiscuously killing,
But I learned about flying from them.

Then in the course of events
I was put on the flexible Sop;
Built by the French for the Russians,
Or built by a yegg for a cop.
Taught me the art of forced landings,
Slinging her oil with a whirr,
The motor would bust whene'er you took it on trust,
But I learned about flying from her.

Then I went to the front in a coffin,
What's known as the D. H. 4.
And I ran from the Pfalz and the Fokkers
Till I don't want to fly any more.
Jerry had fire-balls and archies,
And Fokkers with Spandau guns;
And the things that he shot in our path were a lot,
But I learned how to fly from the Huns.

So I've taken my ships as I've found 'em,
And I've had my fair share of the fun;
But the more that I see of the Camels,
The more do I pity the Huns.
And the end of it's sittin' and thinkin',
And following the circle 'round.
So be warned by my tale, which I admit is some wail,
And fight your damned wars on the ground.

Lt. C. C. Seale, 135th Aero Squadron.

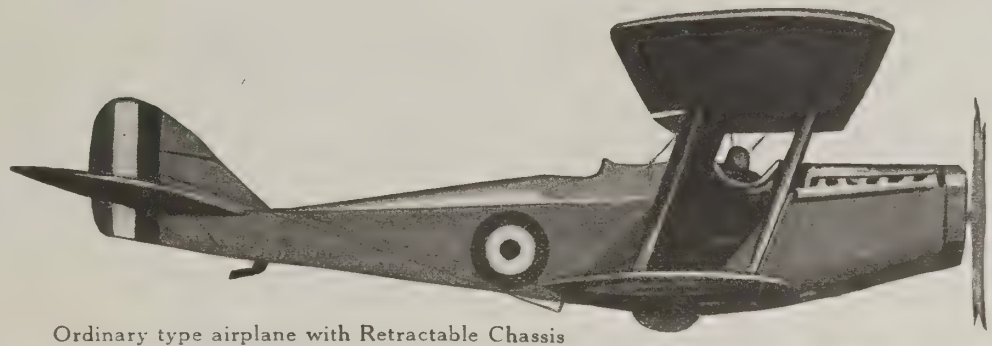
EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS



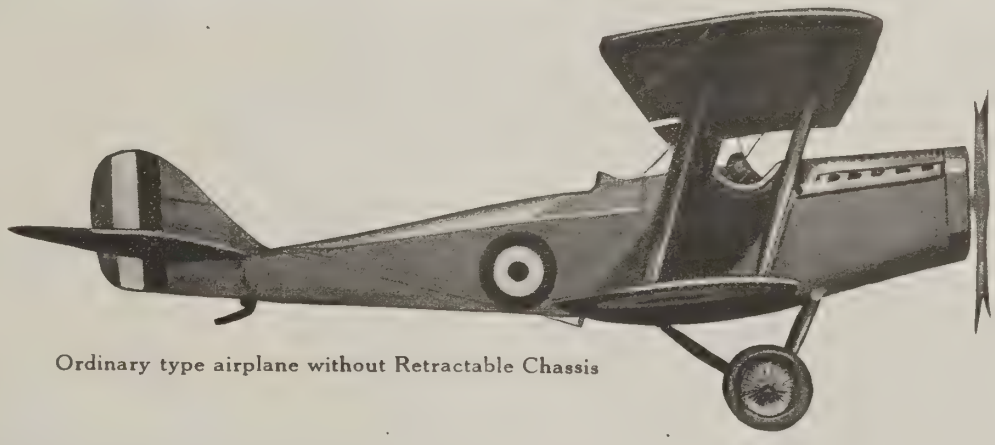
Can you Imagine These Birds in a Race for Speed?



Or These Planes in a Speed Test?



Ordinary type airplane with Retractable Chassis



Ordinary type airplane without Retractable Chassis

The following is an extract from a report by Mr. L. V. Kerber on one of the latest U. S. Army airplane designs:

Effects of retracting the Chassis

Total Resistance of Extended Chassis	59.6#
Total Resistance of Retracted Chassis	11.0
Difference	48.6
At 100 miles per hour the structural resistance with chassis extended is 230# plus 48.6	278.6
By retracting the chassis the structural resistance is decreased $\frac{48.6\#}{278.6}$	17.4%
At 100 miles per hour the total resistance with chassis extended is 210 plus 278.6	488.6#
By retracting the chassis the total resistance is decreased $\frac{48.6\#}{488.6}$	10%
By retracting the chassis the maximum horizontal velocity is increased $\frac{145}{137} - 1$	6%

In order to meet both aerodynamical and practical demands the following patented features will be recognized as indispensable to any type of retractable chassis:

1—The chassis should be equally strong in spite of its retractable feature.
2—It should not weigh more including retracting mechanism than the ordinary chassis.
3—It should neither occupy useful space when retracted nor require an enlarged fuselage to house it.
4—It should be adapted in strength as an alighting device in any intermediate position between fully extended and fully retracted, both in case the pilot should make a hurried descent and in order to make available a ready means of varying the position of the chassis relative to the centre of gravity of the aeroplane.
5—It should automatically close the housing recesses so that the fuselage or wing skin forms a flush surface when chassis is retracted.
6—The gage and tread of the chassis should be independent of the width of the fuselage.
7—It should utilize the forces of flight, since they are always available, for power to retract and extend and such action should be entirely automatic when released by the pilot.

For Engineering data and License apply to

Capt. Jas. V. Martin, Martin Aeroplane Factory, Elyria, Ohio.
Business address: 918 Reibold Bldg., Dayton, Ohio

EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

TO THE

RETIRED SERVICE FLIERS

With apologies to

WALT MASON

of the

New York Evening Globe

You played YOUR part and did your share, —p'raps over here, p'raps over there—and hate like smoke to quit the game, and life somehow don't seem the same. You hung around the dear old ship and said "Good Bye" with quiv'ring lip and now it's back to bench or chair (Gosh, it WAS good, away UP THERE)—And now you're grouchy, sore and glum, and think the world's gone on the bum. Cheer up, old top, it ain't so bad, for there's good news to make you glad and comes from North, South, East and West,—of all good news it's far the best. BELLANCA'S 'BUS has shown how soon the flying game is timed to boom. Ere long the skies will tell the tale how sky-high enterprise can't fail, with YOU at work with work galore, all you can do and then some more. 'Twould take too long to tell it here, but just to prove the news sincere, just sit down NOW and write a line, address it "Number two nine nine" and say just what you'd like to do and see if wishes can't come true.

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55 H.P. ANZANI

TWO-SEATER BIPLANE

Price Complete

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F. O. B.

(*Continued from page* 255)

R. A. E. Metallurgical Report

Chemical Analysis

The chemical compositions of the crankshaft and piston are as follows:

Crankshaft—	Per cent.
Carbon	0.48
Silicon	0.32
Sulphur	0.061
Phosphorus	0.016
Manganese	0.32
Nickel	2.59
Chromium	1.17
Vanadium	Nil
A 1 Piston—	
Silicon	0.45
Iron	1.06
Copper	1.90
Tin	Nil
Zinc	15.62
Manganese	Nil
Aluminium (by diff.)	80.97

Mechanical Tests

Mechanical tests on the crankshaft gave values stated below:

Mark.	A. Web. Longitudinal.	B. Web. Transverse.	C. Pin.
Diameter	.249 in.	.253 in.	.249 in.
Yield point, tons/sq. in.	44.6 in.	44.5 in.	46.3 in.
Ultimate stress, tons/sq. in.	55.5 in.	54.4 in.	56.4 in.
Elongation on 4 √A.	19.5%	12.8%	20.8%
Reduction of area	48%	24%	56%
Impact, ft. lbs.	28 / 25	26 / 25	41 / 41

(*Continued from page* 239)

Dunne at the Whitehead factory in England is another British entry. It is stated that this machine will have a capacity for fifty passengers.

The fifth British entry has been made by Major J. C. Wylie, pilot, and Captain C. C. Wylie, navigator. Major Wood purposes to use a special plane equipped with a 375-horsepower motor, capable of a speed of 95 miles an hour when carrying a weight of 2,632 pounds.

F. P. Raynham, a veteran aviator, is the sixth British entry. He will fly a machine designed for the trans-Atlantic flight by the Martinsyde Aeroplane Company, of England.

Sydney Pickles, an Australian aviator, also entered, states he has a machine faster than any of the others.

Both the French entries contemplate flying from Cape Dakar, Senegambia, Africa, to Pernambuco, Brazil, the shortest distance across the Atlantic. It can be made in three short flights—from Cape Dakar to Cape Verde Islands, 400 miles; from Cape Verde Islands to St. Paul Rocks, 900 miles, and from there to Pernambuco, 450 miles.

Lieutenant Fontan actually started on this flight March 18, but had to postpone it on account of a cracked cylinder. The other French entry is Captain Coli, who recently crossed the Mediterranean and made the return trip within 24 hours.

The Caproni Aeroplane Company of Italy is building a huge biplane for the trans-Atlantic flight, but no details have been made public nor has it been stated who is to be the pilot.

The Last Lap

(*Written exclusively for the* AERIAL AGE WEEKLY)

Emerging victoriously from the smoke of war, America slowly is advancing toward the peace and prosperity for which all men and women have been yearning. Dedicated to ideals consecrated by the sacrifices of her thousands of sons, she advances toward what should be a future of larger and finer development of national resources and energies.

The only obstacle in our path as we seek prosperity now is the cumulative war debt, consisting of bills owed for munitions, supplies, maintenance and transportation costs and other items for building up and later demobilizing our great military machine. The debt is a huge sum; to pay it the Victory Loan is to be flotaed by popular subscription. Carter Glass, Secretary of the Treasury, commenting on the outlook for its success, a few days ago said:

"Four Liberty Loans have gone over the top and nothing nor anybody can shake my faith in the purpose of the country to put the capstone to the splendid structure of national credit by making the Victory Loan an abundant success."

The faith proclaimed by Mr. Glass is echoed by opinions of veteran observers of American moods. There are alive in America to-day two factors which guarantee the success of this loan—the spirit of thanksgiving for our victory, and the earnest desire for the advent of an era of unhampered peace and prosperity.

Successful flotation of the Victory Loan means the Government will pay the war bills and money will circulate again in ordinary commercial channels. The tonic effect on business cannot be overestimated; we confidently can look forward to a tremendous revival of trade projects, provided we buy enough Victory Notes.



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Landing speed, 35 M. P. H.

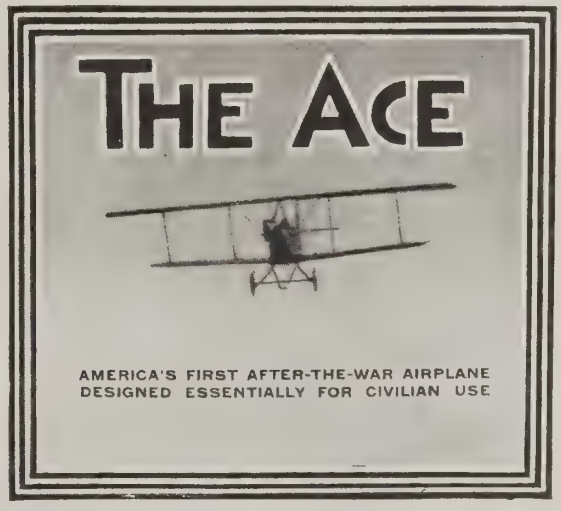
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Our Freighter and 12-Passenger Airplane soon to be announced

THE GLENN L. MARTIN COMPANY
CLEVELAND

Contractors to the United States Government

(*Continued from page* 246)

serious enough to overbalance the other advantages of the exhaust turbine driven supercharger as compared with other types.

Of course, around the turbine rotor there is atmospheric pressure, whatever its value may be at any given altitude, and as the supercharged engine exhausts at a normal pressure of about 30 in. of Mercury, corresponding to a normal atmospheric pressure of about 15 lbs. per sq. in. at sea level, the expansion of the gases from this pressure to that of the atmosphere at any given altitude is sufficient to operate the turbine at high speed. Ordinarily, the turbine rotor speeds run up to 25,000 or 30,000 R.P.M. in these devices, due to this expansion. There is plenty of energy to take care of the needs of the device, as will be evident.

The rotating member of the compressor being on the same shaft as the turbine rotor, it is designed to draw in the rarefied atmosphere and compress it to normal ground level value —also approximately 15 lbs. per sq. in. This compressed air is sent direct to the carburetor or carburetors through the intake piping system.

Thus it will be seen that the engine gets its charge at sea level pressure and discharges at this pressure, and although this condition is artificially maintained regardless of the height (up to the limits of altitude for which the turbo-compressor is designed), the engine may be considered as being always operating in ignorance of the fact that it is not on the ground at or near sea level.

From this it will be seen that in order to maintain efficient operation, the induction piping system of the apparatus must be proof against air leakage. That is, there must be no chance for pressure escape between the carburetor air intake connections and the induction piping running from the air compressor. Similarly, the junction between this induction piping and the compressor casing proper must be air-tight. While maintaining air tight connections of this kind offers some difficulties under service conditions, this is not considered a very difficult matter, since special types of gaskets and connections have been and are being devised to take care of this point efficiently.

Experiments with this system indicate that of the energy of combustion, the engine and turbo-compressor utilize about 33 per cent., whereas approximately 45 per cent. is lost in the exhaust which finally escapes from the discharge ports of the turbine. The balance of the combustion energy is given up to the cooling water and is dissipated in other mechanical losses throughout the cycle.

When the United States entered the war, as has already been pointed out, the Allied countries had already done 2 or 3 years experimental work on various types of supercharging systems. Soon after our entry into the struggle, Mr. E. H. Sherbondy and Dr. Sanford A. Moss were requested by the government to take up the investigation and research and development work on supercharging for our own Air Service. Mr. Sherbondy brought to the work long experience in the design of internal combustion engines and in power-plant and turbine construction. Likewise, Dr. Moss, engineer for the General Electric Co., Lynn, Mass., has had a great deal of experience with exhaust turbines, carrying on such experimental work for his concern over a long period.

Both of these engineers worked primarily with the Rateau system, as already described, and although the same cycle of operations was followed in each case, as Rateau originated, their work is mechanically very little like that of Rateau. Dr. Moss and Mr. Sherbondy carried on their experimental work also entirely independently of one another, evolving units which have no mechanical similarity whatever. It was only after careful study of the various types of compressors, drives, etc., that they arrived at the centrifugal compressor-exhaust turbine system as presenting the greatest possibilities.

The designs of the machines and the results of the tests of the Moss and Sherbondy devices offer an interesting series of experimental and engineering records, and although up to the time of the signing of the armistice the machines had not been developed to the stage where there were ready for flight testing, the various difficulties incident to any new development work were so far toward practical solution that if the war impetus had been maintained, it is probable that we should have seen American supercharging systems in the air this spring or summer.

(*To be continued*)

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OCT 29 1919

AERIAL AGE WEEKLY

Vol. 9, No. 6 APRIL 21, 1919 10 CENTS A COPY



An Aviator's View of the National Capitol and the Library of Congress taken from an Altitude of 1,000 feet

Boston Globe, Cleveland Plain Dealer and Atlanta Journal Offer Trophies and $3500 Cash Prizes for Competition

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VOL. IX NEW YORK, APRIL 21, 1919 NO. 6

BOSTON "GLOBE," CLEVELAND "PLAIN DEALER," AND ATLANTA "JOURNAL" OFFER TROPHIES AND $3,500 CASH PRIZES FOR COMPETITION IN MAY

President Wilson May Attend Atlantic City Convention

THREE other leading American newspapers, the Boston *Globe*, the Cleveland *Plain Dealer* and the Atlanta *Journal*, have joined the New York *World* and the St. Louis *Post-Despatch* and have offered trophies and cash prizes for competition at Atlantic City during the Second Pan-American Aeronautic Convention and Exposition which will last from May first to June first.

The Boston *Globe* and Cleveland *Plain Dealer* decided to offer a trophy and $1,750 in cash prizes each for a competition to be open to Army, Navy, Marine Corps and civilian aviators. The cash prize of $1,000 and the trophies are to go to the aviators who make the best time in flying from Atlantic City to Boston or vice versa, and from Cleveland to Atlantic City, or Atlantic City to Cleveland, during the month of May. The aviators making the second and third best records will receive the second prize of $500 and the third prize of $250, respectively.

This makes a total of nine trophies that have been offered for competition at Atlantic City in the month of May, as follows:

(1) The Curtiss Marine Flying Trophy and $1,000 cash prize;

(2) The Pulitzer Trophy, to be awarded to the aviator who makes the best record in flying from anywhere to Atlantic City, and from Atlantic City to anywhere during the month of May;

(3) The Boston Globe Trophy and $1,750 cash prizes to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record in flying from Atlantic City to Boston, or from Boston to Atlantic City, during the month of May; $500 and $250 to the aviators who make the second and third best records, respectively.

(4) The Cleveland Plain Dealer Trophy and $1,750 cash prizes, to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record flying from Atlantic City to Cleveland, or from Cleveland to Atlantic City, during the month of May; $500 and $250 to the aviators who make the best records, respectively.

(5) Colonel William A. Bishop's "Ace of Aces Trophy," to be awarded to the aviator who makes the best record in flying from Toronto to Atlantic City, or from Atlantic City to Toronto, during the month of May.

(6) $2,000 Intercollegiate Seaplane Speed Trophy, to be awarded to the college whose representative makes the best record in flying twenty times over a five-kilometer course at Atlantic City during the month of May.

(7) $2,000 Intercollegiate Aeroplane Trophy, to be awarded to the college whose representative makes the best record in flying twenty times over a five-kilometer course at Atlantic City during the month of May.

(8) The Intercollegiate Dirigible Trophy.

(9) The Intercollegiate Balloon Trophy.

All of these contests, except the intercollegiate, are open to Army, Navy, Marine Corps, intercollegiate and civilian aviators. The rules are similar, so that a competitor can compete for more than one trophy in one flight.

The intercollegiate contests are open to both graduates and undergraduates.

Besides the above there are the Valentine prizes, amounting to $10,000, awarded under the will of Mr. Samuel H. Valentine, late member of the Board of Governors of the Aero Club, also to be competed for at Atlantic City during the month of May.

A number of entries have already been received and it is expected that the total number of entries will be close to one hundred, including five Lafayette Escadrille aviators and numerous Army, Navy and Marine Corps aviators.

President Wilson May Attend Convention

President Wilson may attend the Aerial Races and Second Pan-American Aeronautic Convention to be held at Atlantic City from May first to June first, according to advice received by Mr. Augustus Post, the Secretary of the Joint Convention Committee of the Aero Club of America and the Aerial League of America.

The President has received invitations to attend several of the conventions to be held at Atlantic City during the month of May, including the Pan-American Aeronautic Convention and Exposition, which will last the entire month. It is understood that he will accept one of these invitations. As two other invitations were extended ahead of the Aeronautic Convention, the Aero Club and Aerial League authorities can only hope that their invitation may be accepted. But no matter which the President accepts, a special aerial contest will be held in his honor in which Army, Navy, Marine Corps, Aerial Police and collegiate aviators will participate in number.

Army Will Use Atlantic City Aviation Field

To facilitate the work of the Army, Navy, Marine Corps and Post Office Department aviators on the Atlantic Coast, the Aero Club of America, the Aerial League of America and the Atlantic City Aero Club have offered the use of the Atlantic City Aviation Field to these Government fliers. The Army has accepted the offer. General Charles T. Menoher's letter follows:

WAR DEPARTMENT
AIR SERVICE
Washington April 10, 1919

My dear Mr. Post:—

I beg to acknowledge receipt of your telegram of even date, extending the invitation of the Aero Club of America and the Aerial League of America to me and through me to the United States Air Service for the unlimited use of their official aviation field at Atlantic City. I desire to assure you that the courtesy thus extended is deeply appreciated. Permit me, on behalf of the United States Air Service, to express my sincere thanks for their kind offer and the spirit which prompted them to make it.

Co-operation and cordial feeling between the Aero Club of America and the Aerial League of America and the Air Service of the United States is a condition of affairs much to be sought, and should result in material advantage and benefit to the future of aviation in this country.

Again thanking you for your courtesy, I am

Sincerely yours,
(Signed) Charles T. Menoher,
Major General, U. S. Army.

This field, which is located only 2,000 feet from the Boardwalk, is ready for use now, but will be duly fenced and fully graded and have hangars within the coming two weeks. In the meantime, it can be used as it is.

This field covers approximately 160 acres and affords runways on two sides of a square of 3,000 feet each. It is surrounded on two sides of the square by water and flat land, without obstructions, making an ideal field in every way.

It affords landing facilities for landing aeroplanes and seaplanes.

Within two weeks it will be possible to supply Army and Navy aviators with gasoline, oil and other facilities.

No charge will be made for the use of the field, police protection, etc.

The field has a frontage of 3,400 feet on Albany Avenue and 2,500 feet on Southern Boulevard. The entrance is on Albany Avenue, only 2,000 feet from the Boardwalk and four minutes' auto ride from the railroad station.

A suitable clubhouse will be ready within a few days near the field, where Army and Navy aviators will find club facilities.

The field is also the municipal field of Atlantic City and the official field of the Aero Club of Atlantic City. There will be conducted on it important experiments in different lines of aeronautics, especially dealing with the application of aircraft for useful purposes.

Army and Navy May Permit Reserve Aviators to Compete

About two hundred reserve Military and Naval aviators who were demobilized during the past two months are eager to compete for the trophies and prizes offered and Mr. Alan R. Hawley, President of the Aero Club of America, telegraphed to the War and Navy Departments urging the Departments to supply the aeroplanes needed to permit these aviators to compete.

The War Department and the Navy Department have thousands of aeroplanes and motors which are not being used and which really constitute a problem to the authorities, who have to find ways and places to store them away.

Under the rules, these reserve aviators are to be given an opportunity to get flying training periodically. If they are permitted to use the machines which are idle they will get their training and the machines will be employed at this time when conditions are most propitious and the aviators can compete for the Pulitzer Trophy, the Boston Globe Trophy and $1,750 prizes, the Cleveland Plain Dealer Trophy and $1,750 prizes, the Colonel Bishop "Ace of Aces" Trophy, the $10,000 Samuel H. Valentine prizes and other trophies and prizes to be competed for at Atlantic City during the Second Pan-American Aeronautic Convention, which will be held from May first to June first.

The aeroplanes of which the Army and Navy have a great number are the De Haviland biplanes, equipped with a 400-h.p. Liberty motor, and the Curtiss seaplanes, equipped with one and two low-compression Liberty motors rated at about 340-h.p. The Army also has a lot of machines equipped with Hispano-Suiza motors.

In telegraphing to the Army and Navy authorities urging the loan of aeroplanes to reserve aviators, Mr. Hawley pointed out that the forthcoming aerial contests will greatly help the Liberty Loan and the recruiting of the 15,000 men needed by the Army Air Service.

Columbia Forms Aero Club to Buy Aeroplanes to Compete In Intercollegiate Events

A luncheon was given at the Aero Club of America April 12 by the newly formed Aero Club of Columbia University, of which Colonel Edwards is the Honorary President, for the purpose of discussing plans to enter the intercollegiate contests to be held during the SECOND PAN-AMERICAN AERONAUTIC CONVENTION AND EXHIBITION, to be held at Atlantic City during the month of May, and to compete for the Pulitzer Trophy and the Boston Globe Trophy, which have been offered for long-distance cross-country flying. It was decided to acquire a number of aeroplanes and to enter for all the events.

The meeting was addressed by Mr. Alan R. Hawley, President of the Aero Club of America; Mr. Henry Woodhouse, member of the Board of Governors of the Aero Club of America; Dean George B. Pegram and Lieut. Edward L. Smith of Columbia University; Major John M. Hauser, U.S.A.; Captain Granville A. Pollock, U.S.A.; Mr. A. Francis Arcier, Chief Designer of the Handley Page Company, England, and Augustus Post, Secretary of the Aero Club of America.

Among the members of the Aero Club of Columbia University present were the following officers and guests: Alan R. Hawley, President of the Aero Club of America; Dean George B. Pegram, Engineering Department of Columbia University; Lieut. Floyd Gahman, U.S.A.; Lieut. Bryan M. Battery, U.S.A.; Capt. Granville A. Pollock, U.S.A.; Major John M. Hauser, U.S.A.; Lieut. A. K. Doolittle, U.S.A.; Lieut. Arthur L. Tait, U.S.A.; Lieut. Aubrey R. Marrs, U.S.A.; Lieut. Guy Lennstrand, R.A.F., Secretary of Columbia Aero Club; Captain S. Herbert Mapes, U.S.A.; Lieut. Lee Britton Land, U.S.A.; Lieut. Campuzano; Major Thomas S. Baldwin, U.S.A.; Lieut. Edward L. Smith, U.S.A.; Dean H. W. Hawkes, of Columbia University; Mr. Henry Woodhouse; Mr. A. Francis Arcier, Chief Designer, Handley Page Co., England; Capt. O. J. Gangnier, R.A.F.; Capt. William Menkel, U.S.A.; Lieut. D. W. Lane; Lieut. James Finley Cavagnaro; Lieut. Malcolm G. Spooner, U.S.A.; Lieut. Rutledge G. Barry, U.S.A.; Augustus Post, Secretary of the Aero Club of America; Lieut. R. M. Craigmyle, R.A.F., Treasurer of the Columbia Aero Club.

FEDERAL JUDGE HOLDS THAT WAR HAS LEGALLY ENDED HERE

IN line with an informal statement from the bench on March 24th, Federal Judge Walter Evans, April 3rd at Louisville, Ky., handed down a decision finding that the war in Europe legally is at an end and that a plea for a new trial on conviction of violating war-time military regulations after the armistice was signed has standing in court.

Judge Evans based his decision upon an address by President Wilson before both Houses of Congress in joint session November 11, 1918, in which he said, referring to the defeat of Germany: "The war thus comes to an end." The President, said the court, had authority to make the pronouncement under that section of the Constitution which provides that he may from time to time go before Congress and give it information as to the state of the union.

This decision is most interesting to the aeronautic fraternity from many standpoints. It places the aeronautic movement on a peace time basis and brings to an end all the war restrictions.



The News of the Week



The Trans-Atlantic Flight

Despite the warning of the British Admiralty on April 13 that weather condition were "very unsatisfactory for an aerial crossing of the Atlantic and also are such that a forced landing on the sea would be attended by considerable risk," Harry Hawker announced after a test flight that he was going to start from Newfoundland as soon as conditions were in any way favorable. The test flight was made on April 10 and lasted forty-five minutes. Everything was pronounced as ready for the flight.

Major C. W. F. Morgan, a British aviator, arrived on board the steamship Sachem from Liverpool on April 11, bringing the Martinsyde aeroplane with which he will attempt a transatlantic flight. Accompanying him was Lieutenant F. P. Raynham, who is to act as pilot. His plane has already been assembled. The Martinsyde plane is smaller than the Sopwith and carries no boat or other life-saving equipment.

The naval transatlantic flying boat NC-2 broke records on April 11 by carrying a dead weight of 28,500 pounds in a flight lasting twenty minutes. She rose from the waters of Jamaica Bay with comparative ease, despite the great load, and attained an altitude of 1,500 feet. After circling around for twenty minutes she returned to her landing stage. Officers in charge of the navy's transatlantic fight arrangements expressed themselves as "highly pleased' 'over the performance.

Assistant Secretary of War Franklin D. Roosevelt was a passenger aboard the NC-2 on April 13, on his visit to Rockaway Naval Air Station to inspect the transatlantic planes.

According to a press dispatch dated April 13, owing to weather conditions—wind with rain and hail storms—Major Woods was unable to make his start from Limerick, Ireland, in the attempt to fly across the Atlantic. It is stated that he will start from East Church on the following day. Major Woods is using a Rolls-Royce motored short biplane.

The Handley Page Company has officially entered one of its aeroplanes which had been built for a bombing expedition to Berlin in the transatlantic flight. The machine has four 350-horse power engines and a capacity of 2,000 gallons of gasoline for a twenty-five-hour flight. Two small air tanks will keep the plane afloat if it falls into the sea. The crew will consist of three pilots and a wireless operator.

The Handley Page machine will be taken to Newfoundland and will fly from there to the British Isles.

Lieutenant J. P. Fontan, who started on April 8 on the first leg of a flight which he intended should take him across the Atlantic from the Cape Verde Islands, was compelled to land near Bourges, 110 miles from his starting place near Versailles.

Aviators Aid Liberty Loan

New York, N. Y.—Sixteen aviators, five of them "Aces," left Hazelhurst field shortly before 2 o'clock on April 11, for New York, where they bombed the city with literature advertising the Liberty loan.

Major Henry Miller, in command of the squadron, was the first to leave the ground. He piloted a Handley Page machine.

The chief interest was centered on two of the seven planes which flew over the city. These were Fokker biplanes captured from the Germans. They were flown by Capt. A. D. Simonin and Lieut. Guy Stewart.

New York Police Aviators to Train at Atlantic City

Atlantic City, N. J., April 11.—Atlantic City's municipal aviation field will be the training quarters for the aerial police squadron of New York through arrangements made by Captain Granville Pollock, commander of the First aero squadron of the New York Police Department with the Aero Club of Atlantic City. According to plans announced through President A. T. Bell, of the local club, it is the intention of Captain Pollock to open the school within the next few days, after Colonel Jefferson De Mont Thompson, head of the aviation section of the New York Police Department, comes here to inspect the field, which is being placed in readiness for the Pan-American Aeronautic Exposition during the month of May.

Captain Pollock and his squadron will send details to police the flying routes here during the aviation meet and to act as guides to aerial strangers who may drop in to participate in the various events that have been arranged. This will be the first time in the history of aviation that a racing course has been regularly policed by aeroplanes.

Lafayette National Park to Have Memorial for Airmen Lost in War

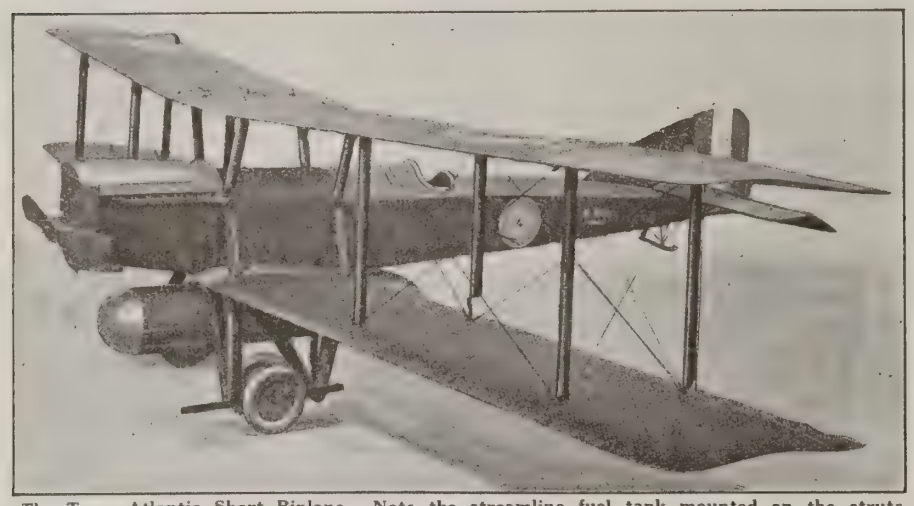
Boston, Mass.—According to H. W. Gleason, before the National Geographic Society, there will soon be placed in Lafayette National Park a bronze eagle in memory of all the aviators of America who lost their lives in the world war, and below will be a bronze tablet recording their names. It is to be known as "Honor Crag."

Governor Edge Vetoes Bill Prohibiting Aerial Hunting

Trenton, N. J.—Governor Edge vetoed the Hyland bill prohibiting shooting of game from aeroplanes. He declared against burdening the statute books unnecessarily, and thought that the noise of aeroplanes was in itself adequate protection for game.



Admiral William L. Sims was escorted into New York Harbor by seaplanes and blimps, when he returned aboard the Mauretania recently



The Trans-Atlantic Short Biplane. Note the streamline fuel tank mounted on the struts of the undercarriage

Army Inspects Atlantic City Aero Field

Atlantic City, N. J.—Major L. B. Lent was sent to Atlantic City by the aerial division of the Department of the East to inspect the aerial landing field in process of construction here for the coming Pan-American aeronautical meet. He expressed himself as pleased with the site selected.

Major Lent made the trip from Brindley Field, L. I., to Atlantic City in less than two hours. After leaving Red Bank at quarter-past twelve o'clock he made the last leg of the journey at a speed of 100 miles an hour.

Will Carry Bale of Cotton to Atlantic City in Flight for Pulitzer Trophy

One of the entrants for the long-distance, non-stop flight for the Pulitzer Trophy will represent the Chamber of Commerce of the City of Americus, Ga., when the contest is held in May, during the second Pan-American Aeronautic Conference and Exposition at Atlantic City.

The Americus aviator who is yet to be chosen will not fly "light," but will carry northward with him from Americus to Atlantic City a bale of cotton. This will be auctioned on the boardwalk and the proceeds donated to the Red Cross.

International Air Regulations Framed

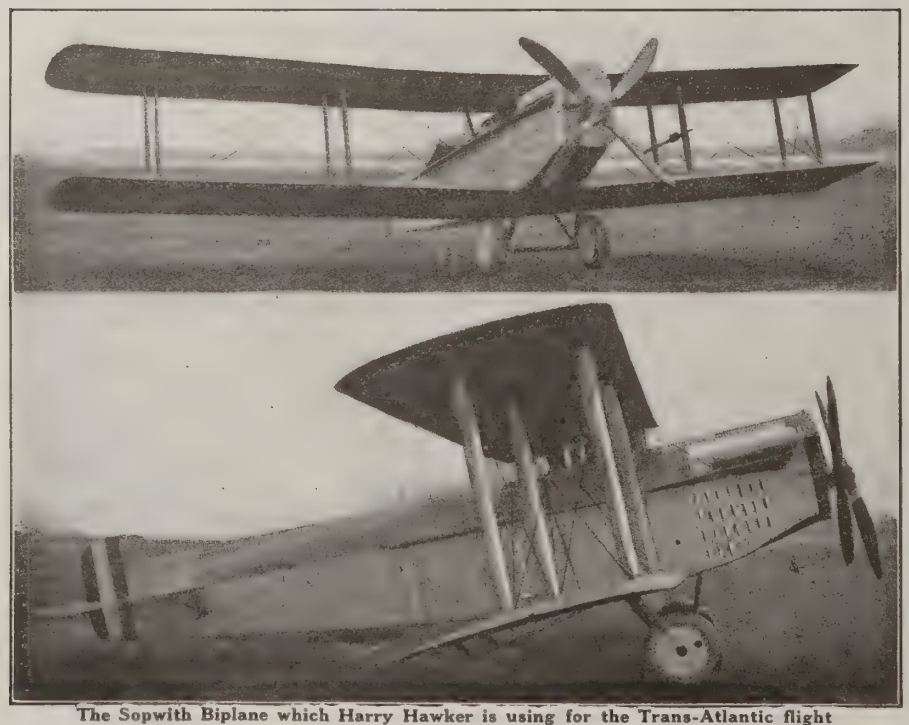
Paris, April 13.—The proposed convention regarding international aerial navigation has been completed by the judicial and military sub-committees of the aeronautical commission of the peace conference, on which Brigadier-General Benjamin D. Foulois, Major Pollock and Captain Bacon represent the United States.

The convention is composed of forty-one articles, which establish an international agreement on sovereignty of the air, provide for the concession of inoffensive voyages between the contracting states and deal with forbidden zones and international aerial routes.

140 American Aviators Presented with Banners Made by French Women

Paris, France, April 12.—Stephen Lausanne, editor of the *Matin*, greeted 140 American aviators of the First and Second Divisions at a meeting held in Paris in their honor. Mrs. Woodrow Wilson, General A. Y. E. Dubail, formerly Military Governor of Paris; Colonel House and Mrs. House, Admiral William S. Benson and Mrs. Benson and Josephus Daniels, Secretary of the American Navy, and Mrs. Daniels were present.

Brig.-Gen. Mason L. Patrick replied for the American aviators, his speech being translated by Col. E. L. Gros, founder of the Lafayette Escadrille. Banners made by the women of France for the aviators were presented in turn by the famous French airmen, Captains Heurteaux Nungesser and Madon.



The Sopwith Biplane which Harry Hawker is using for the Trans-Atlantic flight

National Aeronautic Committee To Build Air Service Clubhouse

New York, N. Y.—The National Aeronautic Committee of 7 East 36th Street, of which Mrs. Charles A. Van Rensselaer is Chairman is collecting funds to build a clubhouse for the Air Service Association. The clubhouse will be a memorial and will probably be built in New York, as sites here have already been considered, and plans have been drawn up by F. Burrall Hoffman, Jr., the architect.

Mrs. Newton D. Baker is Honorary Chairman of the committee, and Mrs. E. H. Harriman, Mrs. Benjamin Thaw, Mrs. Henry A. Wise Wood, Mrs. Clinton Gilbert, Mrs. Charles S. Whitman, Mrs. William H. Crocker and Mrs. French Vanderbilt Fitzsimons are among the active workers.

Utica Establishing Aerodrome

Utica, N. Y.—A company to be known as the Mohawk Valley Aeroplane Company has been incorporated with a capitalization of $30,000 for the purpose of establishing a municipal aerodrome in Utica.

The officers of the company are: President John M. Ross; vice-president, Arthur B. Maynard; treasurer, Newton F. Hand; secretary, Stuart J. Davies.

The company will offer the public pleasure flights at rates to be announced later. Two Curtiss JN4D aeroplanes have been purchased for this purpose. Stuart J. Davies, an ex-Air Service aviator, will act as pilot.

The company will also maintain a service agency for the sale of the better known types of planes costing from $2,500 to $20,000.

Smithsonian Institute Exhibiting Many Aeroplanes of Historic Interest

Washington, D. C.—The United States National Museum, which is part of the Smithsonian Institute, has already placed extensive exhibits of aeroplanes and other aeronautical material on permanent exhibition. It has in its possession the small planes built and flown by Professor Langley in 1893-1896, and the large plane built under government order, which was launched in 1903, but failed to fly on account of unsatisfactory launching gear. A successful flight has since been made by Glenn H. Curtiss at Hammondsport with this model.

The Museum also has the first government owned machine built by the Wright Brothers, training planes used by the United States Army and bombing and reconnaissance planes used by the French Air Service. The first American built battleplane, made by the Dayton-Wright people, equipped with the original 12 cylinder Liberty motor, with a record of 1,078 hours in the air, having covered a distance of 111,000 miles, is another feature of the Smithsonian exhibit. When

the work of collection is completed, there will be models of all planes, engines and accessories in production at the close of the war.

The aircraft exhibit is part of a complete permanent exhibition of all types of war equipment, including tanks, field equipment and guns, mementos of events, naval and military decorations and insignia, books, paintings and photographs.

Curtiss Will Start New York-Atlantic City Passenger Service

Philadelphia, Pa.—America's first passenger- carrying aeroplane system will be established on May 1, when the Curtiss Aeroplane Company places in service four specially constructed seaplanes to fly between New York and Atlantic City. Should the plan prove a success, a similar line will be established between Philadelphia and Atlantic City.

The system will probably be known as the New York-Atlantic City Air Line. Flights will be made on a regular schedule, two planes flying from either terminus and return. The New York landing place is now being arranged at Port Washington, and the seaplanes will alight on the water opposite the inlet at Atlantic City, "taxying" up the inlet to a specially constructed landing pier.

The four seaplanes to be used in this service are now under construction in the plant of the Curtis Company at Garden City, L. I. They are of a special design and will carry from four to six passengers, besides the pilot and a mechanician.

National Advisory Committee for Aeronautics to Erect Laboratory

At a meeting of the National Advisory Committee for Aeronautics, on April 10, the construction of an engine dynamometer laboratory was authorized. The laboratory will be erected on the committee's plot at Langley Field and will cost approximately $15,000.

The purpose of the laboratory is to test internal combustion engines, conduct researches and advance the development in aircraft engines. The study of related problems, including the co-relation of engine performance in free flight with the results obtained on the test stand, will also be made.

DH-4s Fly Across Sierra Nevadas

A report from Mather Field states that on March 22 three De Haviland-4 aeroplanes flew from Mather Field to Sacramento, Calif., thence to Carson City, Nevada, crossing the Sierra-Nevada mountains en route. The distance covered in the flight was 120 miles and the average time was 85 minutes. It was stated that this was the first time the mountains have been crossed by heavier-than-air machines.

The return trip was started from Reno about noon on March 23. A stop was made at Carson City for gas and oil, and at this point, Governor Boyle of Nevada took the place of Lieut. Ruggles in one of the ships, and was carried from the Capital of Nevada to the Capital of California, and thence to Mather Field. Governor Boyle has the distinction of being the first civilian to make the flight across this range of mountains.

An interesting feature of the trip is the time saved in transit between these two cities. Eight hours and five minutes was saved on railroad travel. The average train time between the two capitals is 9½ hours, while the aeroplane averaged 85 minutes. The mountains were crossed at an altitude of 14,000 feet.

Civilian Licenses Issued to Forty Aviators

The Office of the Joint Army and Navy Board of Aeronautical Cognizance, charged with the issuance of civilian Flying licenses, is now located in Room 232, Building D, 6th and B Sts., Washington, D. C. Since the discharge of Lieutenant Haugen, Lieut. A. J. Clayton, A.S.,M.A. has been acting secretary The membership of the Board otherwise remains unchanged.

Applicants for civilian licenses should apply to the Board, addressing the acting secretary, Lieut. Clayton.

There have been issued 40 licenses since February 25, as follows:

License No.	Issued to	Address
339	Alfred S. Koch	Washington, D. C.
340	John Domenjos	New York City
341	James A. Roe, Jr.	New York City
342	Merrill K. Riddick	New York City
344	Penrose B. Metcalfe	San Angelo, Texas
345	John H. Hughes	Macon, Georgia
345a	Harry Richard Kashe	Anacostia, D. C.
346	A. J. Brubaker	New York City
347	Homer M. Berry	Okmulgee, Oklahoma
348	Julian Sykes	Chicago, Ill.
349	Paul W. Peterson	Underwood, Iowa
350	L. S. Ryan	Underwood, Iowa
351	David L. Behncke	Chicago, Ill.
352	Joseph L. Cato	New Haven, Conn.
353	Edgar F. Waters	Milltown, N. J.
354	Louis M. Merrick	Washington, D. C.
355	George Perkins	Washington, D. C.
356	Ellis S. Middleton	Anacostia, D. C.
357	Lyman Patterson	Anacostia, D. C.
358	J. B. Struble	San Francisco, Calif.
359	Stuart J. Davies	Utica, N. Y.
360	Herbert M. Schick	San Mateo, Calif.
361	Charles Henry Kinzie	Philadelphia, Pa.
362	Romer G. Weyant	Lincoln, Nebraska
363	Cortlandt S. Johnson	Washington, D. C.
364	Aircraft Service Corp.	Detroit, Mich.
365	Stuart A. Morgan	New York City
366	James Ward	Houston, Texas
367	Ray A. Dunn	Lynbrook, N. Y.
368	Wesley L. Smith	New York City
369	Earl F. Beers	Essington, Pa.
370	Edward A. Stinson	San Antonio, Texas
371	Paul W. Ward	New York City
372	W. J. Falvey	Brookline, Mass.
373	Hubert E. Phenicie	Manchester, Iowa
374	I. B. Humphreys	Denver, Colo.
375	Lucielle Belmont Baldwin	Chicago, Ill.
376	Charles Theodore	Dallas, Texas
377	Not issued.	
378	Barney Benes	Cleveland, Ohio
379	Frank G. Seyfang	New York City

Albany Has Aeroplane Landing Field

Albany, N. Y., April 9.—The Albany Chamber of Commerce announced that the city is prepared to receive aerial visitors at the municipal landing field, known as Quentin Roosevelt Field, in Beverwyck Park. The tract selected is ready for the use of transient aviators or aerial mail carriers.

Van Rensselaer Island south of the city is suggested by the Mayor as a good landing place for hydroaeroplanes to land and anchor.

Albany is the second city in the United States to have established a municipal landing place, Atlantic City having preceded it only by a few days.



Two captured Fokkers being prepared for a Liberty Loan Flight over New York City

The AIRCRAFT TRADE REVIEW

N. E. J.

Aero Export Plans

American manufacturers of aircraft are taking steps to inaugurate an export business with foreign countries, especially in South America. The commercial adaptation of the aeroplane has been the subject of consular reports and magazine articles in South American republics and many inquiries have been received here from business interests.

Encouraged by these inquiries, the Curtiss Aeroplane and Motor Corporation is sending a special representative to Buenos Aires to confer with business men and sportsmen with a view of starting an export trade.

Like the Curtiss Company, the Aeromarine Plane and Motor Corporation is figuring on a South American trade. This concern has developed a sporting type of flying boat which appealed to a delegation of wealthy South Americans who visited the recent Aeronautical Exposition in this city. Both the Aeromarine and the Curtiss companies have been asked to estimate for a flying boat service on several South American rivers, by means of which those back of the project hope to tap rubber districts hitherto difficult to reach.

The Thomas-Morse Aircraft Company, builders of the Thomas-Morse scout plane used so successfully in combat work, is sending representatives abroad. The latter has developed a two-passenger plane which it believes will appeal to ranch owners living great distances from the cities.

The Packard Motor Car Company, which recently announced its entrance into the aircraft industry, is preparing to export both flying machines and aeroplane motors. The Wright-Martin Corporation has announced that it has been urged to place its Hispano-Suiza engine on the market for export trade. The Glenn L. Martin Company of Cleveland, builder of the wartime Martin bomber, is understood to have concluded plans for an export business.

Curtiss Company Organizes Distributing Agencies

Seven distributing companies have been organized in various parts of the country for the purpose of selling aeroplanes by retail. The companies are incorporated by the Curtiss Corporation.

With the establishment of these companies, a vigorous campaign has been inaugurated for the sale of aeroplanes for commercial purposes. The first showroom to open will be the Curtiss Eastern Aeroplane Company, at Philadelphia. G. S. Ireland, a former army aviator, is president and general manager of this concern. The America Trans-Oceanic Company will be the distributing agent in New York City and Florida.

The other concerns are: the Curtiss Southwest Aeroplane Company, at Tulsa, Okla.; the Curtiss Northwest Aeroplane Company, at Minneapolis, the Curtiss Aircraft Company, at Atlantic City, and the Curtiss-Humphreys Aeroplane Company, at Denver.

The America Trans-Oceanic Company is headed by Rodman Wanamaker. It has double hangars at Port Washington, and will conduct a school there. It will also engage in carrying passengers shortly by inaugurating an air line between New York and Atlantic City.

The Vertimeter, a New Instrument Indicating Rate of Climb

The utility of an instrument which indicates rate of ascent or descent of a plane in flight is obvious to the practical aviator. Therefore the appearance of the Vertimeter was greeted with enthusiasm by those aviators who have had the opportunity of using the device.

In fog and night flying the only guide the aviator has had in determining whether he is maintaining his altitude has been the altimeter. But minutes of flying time and hundreds of feet of unnecessary climb and drop are lost in cross-country flying when the altimeter is depended on. The Vertimeter records rate of ascent or descent in 2/5 of a second.

When the pilot desires to gain altitude he can do so at the machine's most efficient climbing speed. He can maintain the plane at its most efficient flying speed without numerous corrections. He cannot be "lost" in clouds or find himself diving if he is trying to climb through them.

Nor will the aviator put his machine in a stall accidentally, for the Vertimeter will indicate to him the moment he has arrived at his maximum climbing rate.

The instrument consists of a case containing the indicating device connected to a small streamline nickle-plated tank by a rubber tube. The tank is mounted on the under side of the fuselage or along the side or top of a boat hull. The balloon type instruments are self-contained, i. e., the tank and instrument head are placed in a leather case with straps for hanging it to the load-ring.

The instrument is comprised of a glass "U" tube with a trap at each end. One end of the tube is connected to the tank and the other end is open to the atmosphere. The "U" tube is half filled with a thin carbon oil colored red to give contrast with the white scale. On the back of the instrument case is a valve which connects into the line from the tank.

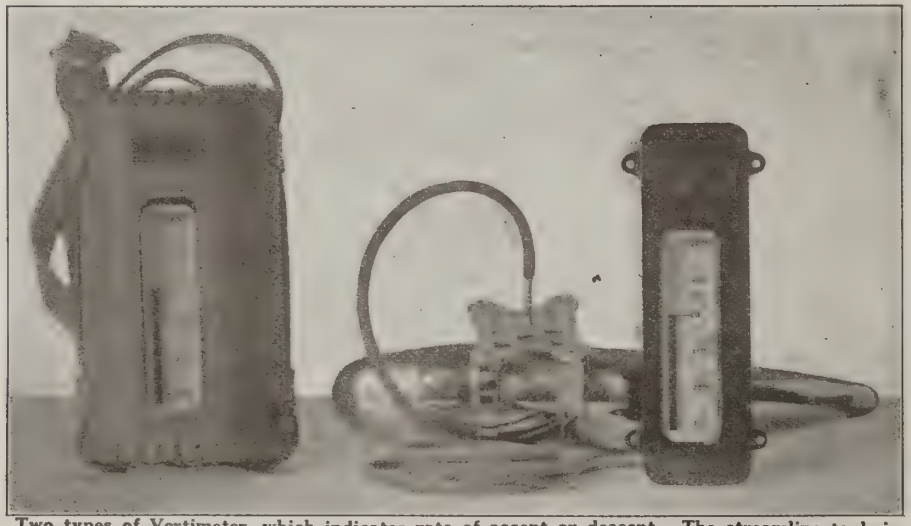
In ascending, the outer air becoming less in barometric pressure causes the air in the tank to pass out through the valve on the back of the instrument. Since the valve opening is smaller than that necessary to provide easy egress, a back pressure builds up sufficiently to cause the oil to rise in the "U" tube toward the end open to the atmosphere. If the rise is kept constant the oil will remain at a level corresponding to a given marking on the scale indicating the feet per minute of motion vertically. In descending all operations are reversed. The instruments are calibrated and adjusted by regulating the size of the escapement valve.

By placing the tank exposed to the outside air it is kept at the same relative temperature, thereby preventing the warm ground level air from continuing to register ascend after a climb has been stopped at any altitude. In practice the air in the tank attains the temperature of the air through which the machine is passing so quickly that no action takes place other than that of registering the rate of change of barometric pressure. The readings taken from a series of flights show accuracy within two-fifths of a second per one thousand feet.

Instruments are provided with scales reading 3,000 feet per minute ascend and 4,000 feet per minute descend or 2,000 feet per minute ascend and 3,000 feet per minute descend, depending on the machine to which the instrument is attached.

Either type of instrument weighs 28 ounces complete.

The Vertimeter is manufactured by the Aeronautic Instrument Co. of New York City.



Two types of Vertimeter, which indicates rate of ascent or descent. The streamline tank is mounted on the fuselage

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative

PILOTS

Dana C. DeHart
Edward V. Gardner
Robert F. Shank
Ira O. Biffle
Leon D. Smith
Gilbert G. Budwig
Trent C. Fry

John A. Jordan, Superintendent, Western Division
Paul L. Ferron, Manager, Belmont Park
Harry W. Powers, Manager, College Park
Lowell S. Harding, Manager, Bustleton
O. J. Sproul, Manager, Chicago
W. J. McCandlass, Manager, Cleveland

PILOTS

E. Hamilton Lee
Lester F. Bishop
Carroll C. Eversole
Charles I. Stanton
John M. Miller
Max Miller
Charles E. Bradley

Cleveland-Chicago Aero Mail Trial Flight Soon

Chicago.—Oliver J. Sproul, chief of the Air Mail Service in Chicago, announced that two aeroplanes carrying mail will fly from Cleveland to Chicago about April 11. The pilots are Michael Ebersole and T. C. Frye.

Another plane is scheduled to make the trip for the Air Mail Service about April 15, piloted by Lester Bishop of Cleveland.

Post Office Department Has Remodelled DH-4s

It was learned recently that the first of an order of remodelled De Haviland planes has been turned over to the Post Office Department. It is said that sixty such planes are to be remodelled to serve as aerial mail carriers, they no longer being required for war purposes.

These planes will be able to carry 500 pounds of mail. The Army has turned over a number of Hispano-Suiza motors manufactured by the Wright-Martin Co.

Trial Flight of France-Morocco Air Route Successful

In connection with the proposed postal service between France and Morocco, Lieutenant Lemaitre, accompanied by M. Letecoere, has made a successful flight from Toulouse to Casablanca. He left Toulouse at mid-day on March 8 and reached his destination at 5 o'clock on the following afternoon, his flying time for the 1,900 kilometres being 11 hours, and the route being *via* Pervignan, Barcelona, Tarragona, Carthagena, Malaga, Gibraltar and Tangiers. The dispatch bag carried contained correspondence between General Lyantey, Military Governor of Morocco, and the Ministry of Foreign Affairs.

British Post Office to Seek Bids for Aerial Mail Carrying

London.—It is stated that the Postmaster-General will shortly invite bids from private firms for the carriage of mails both in England and to foreign countries.

Folkestone-Cologne Mail Plane Makes 100 M.P.H. With 24 Bags of Mail

An R.A.F. pilot in a D.H. 9 machine has made the journey from Folkestone to Cologne with 24 bags of mail in a flying time of 2 h. 14 min. The distance is 225 miles, and the flying speed was therefore a fraction over 100 miles an hour.

New Aero Mail Speed Record for New York-Washington Route

Washington, April 11.—Pilot Leon D. Smith, carrying the mail from Washington to New York, made the fastest flight ever made with a 150 h.p. Hispano-Suiza motor and a Curtiss mail plane. The average speed for the entire distance was 111 miles an hour. He carried, in addition to a full load of gas, 157 pounds of letter mail. The trip, Washington to New York, 218 miles, was made in 1 hour and 58 minutes. The time from Washington to Philadelphia, 128 miles, being 1 hour and 11 minutes, and Philadelphia to Belmont Park (New York) 47 minutes. Visibility was very low.

To Use Photographic Reduction to Lighten Aerial Mails

A British contemporary publication suggests a means of reducing the bulk and cost of transportation of aerial mail which, if adopted, should make it possible for aerial mail to compete with railway mail.

All letters for air post are to be typed or written on a standard size of paper, and the sheets then photographed down to postage-stamp size. The photographs would cross by aeroplane or airship, and be magnified at the other side back to standard sheet size. Under such a system letters could be either posted open by the public and photographed by post office officials sworn to secrecy, and enlarged by officials at the other side before delivery; or, in the case of the correspondence of big firms, they could be posted in midget photograph form. It would pay a big firm with branches in America and Great Britain to have the necessary photographic apparatus at each side of the ocean. With the help of photography what is now a 300-ton mail could be cut down to 30 tons or less.



A British Aerial Mail plane being loaded for a flight to Cologne at the Hawkings Aerodrome near Folkestone

THE GEORGES LÉVY TYPE R FLYING BOAT

SOME of the fastest boats are built in France by the Georges Levy Company, who during the last months of the war were turning out quantities of two and three-place flying boats at a remarkable rate. The type of flying boat illustrated by the accompanying line drawing is a three-place boat with a 280 H.P. Renault engine. The wings are hinged at the inner rear struts and can be folded back so as to take up but little room for storage purposes. The general characteristics are as follows:

Span, upper plane	18 m. 50
Span, lower plane	12 m.
Total length	12 m. 40
Overall height	3 m. 85
Lifting surface	68 sq. m.
Stagger	138 mm. 5
Weight, empty	1,450 kg.
Useful load	1,000 kg.
Speed per hour	145 km.

The following is a general description, directions for rigging and mounting Type R Flying Boat, as supplied by the Georges Levy Company:

Mounting

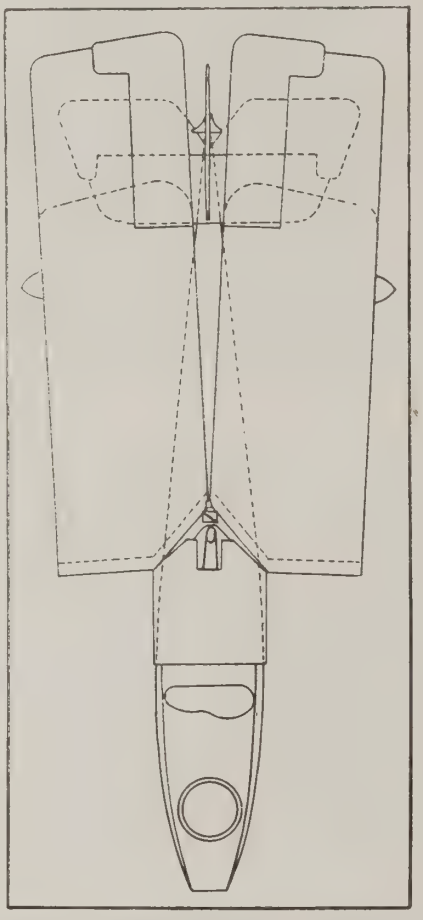
The mounting of the engine frame is accomplished by putting in place six supports; since this mounting has already been done in the factory, the holes have been pierced and their location predetermined. Next the upper plane center section is attached; this should be given the same incidence angle as the short wing sections which are built integral with the hull; that is to say, 37 m. 5. The engine bed should be horizontal. The central panel is staggered about 138 mm. 5 in advance of the lower plane.

Make the connections with the engine controls and of the piping from the engine to the hull.

A pump of the Astra type pumps the gas in the exhaust collector joined to the three tanks and carries it to the small gravity tank located in the upper plane. Two tubes run from the gravity tank, one feeding the carburetor upon which is mounted the stop-cock and a by-pass for the injection pump. The other tube is for the overflow; it is intersected in the center of the strut by a glass sight designed to make visible the working of the pump; this overflow is connected in the hull to the overflow tank adjoining the three fuel tanks. The oil tank is carried in front of the engine between the engine bearers.

The crankcase of the engine contains a quantity of oil sufficient for a duration of 2½ hours, but at the end of 1½ hours, and every half hour thereafter, it is well to open the stop-cock which connects the oil tank to the engine. It is essential, of course, to see that the cap of the tank is perforated to admit the air, as otherwise the vacuum would prevent its proper functioning.

A radiator thermometer is provided to make known at all times the temperature of the radiator water. A sufficient space should be left in the radiator to hold three liters of water to permit of expansion. Radiator water should be free from all limy substances and preference should be given to distilled or rain water.



Method of folding the wings of the Georges Lévy type R flying boat

Mounting Aeroplane Without Engine

In mounting the machine without the engine, the wings are first assembled on the ground. The struts are marked on the lower extremities, M for those in the middle and E for the outer wings. The marks are made to be seen by an observer in the hull when the machine is all assembled. Front struts have on the rear ends several grooves which permit passage of cross aligning longitudinal cables. The bracing is as follows:

Four mm. cables for the first crossing; 3.5 mm. for the second crossing; 2.8 mm. for the last crossing.

Oblique struts are marked at the lower ends with the number of the outer struts which they adjoin. The two wings are assembled so that planes are placed vertically with the leading edge resting on the ground. Without tightening the cables they are raised and put in position on the center plane and hull. Complete the rigging and adjustment of the planes in such a fashion as to have about 37 mm. 5 incidence taken from front wing beam to rear wing beam, a stagger of 138 mm. 5, and a dihedral on the lower plane of 100 mm. (height taken from the level of the outer strut); at this moment the upper plane should be horizontal.

Floats

All wires of the float rigging are loosened and bolts introduced into holes in the wing beams. A draining cap is provided in bottom of floats.

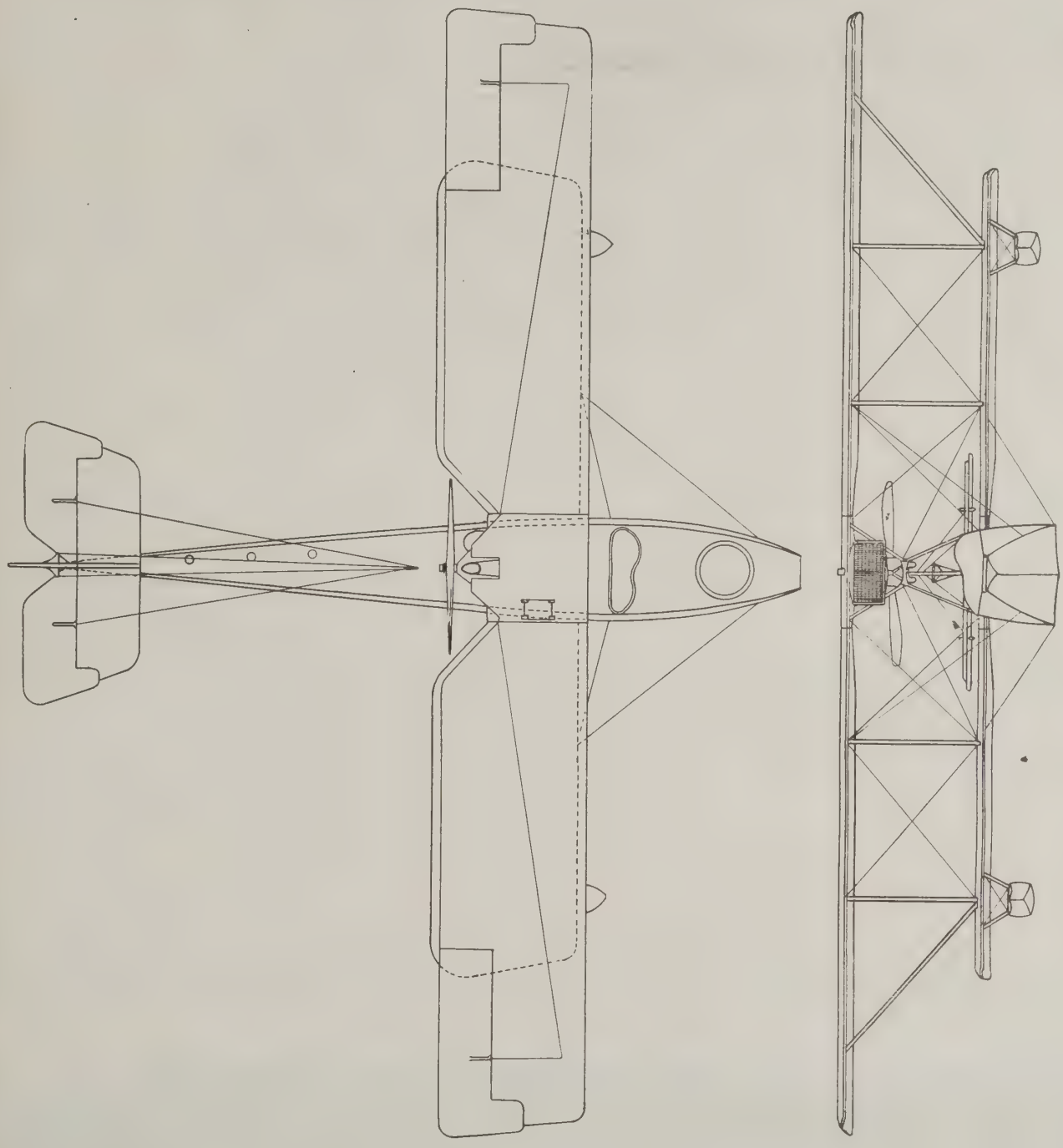
Tail Group

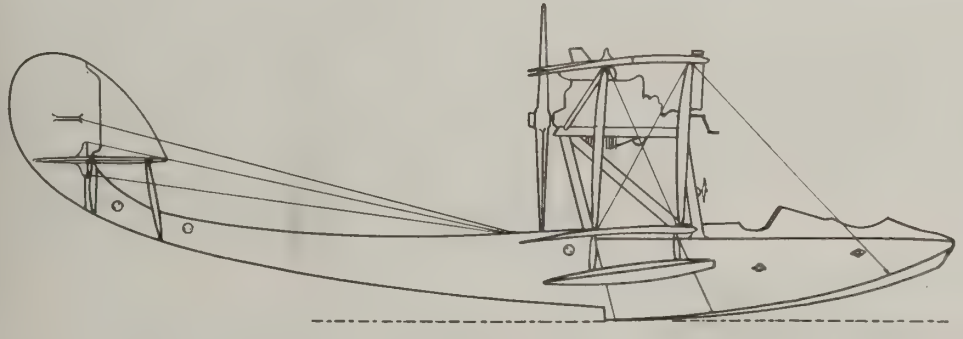
The stabilizer is first put in place supported by five struts; it should be horizontal to line of flight. The elevators are a continuation of the stabilizer. The rudder and fin should be vertical and in line with the longitudinal axis of the machine.

(*Continued on page 278*)



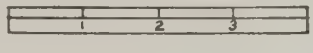
One day's production of Georges Lévy type R flying boats





GEORGES LEVY
TYPE R 300 H P RENAULT
FLYING BOAT

Scale of Metres



McLaughlin

BELLANCA C E TWO-SEATER BIPLANE

AFTER having had such success in the production of the 35 H.P. light tractor, Mr. Bellanca has designed a machine of greater power with which very excellent performances are promised. The Type C E Machine is equipped with a 6-cylinder 55 H.P. Anzani engine, whereas the first machine, which was fully described in the February 17th issue of AERIAL AGE, was powered with a 35 H.P. Anzani.

The installation of the 55 H.P. engine has necessitated slightly greater wing area and weight has been increased by only 70 lbs. The useful load in the first machine was 375 pounds, whereas the 55 H.P. machine can carry a useful load of 510 pounds.

The wing section employed is a modification of Eiffel 32. Wings are not of the warping type, as in the lighter machine, but lateral control obtained by the use of the more universally employed ailerons. The machine has a safety factor of 12 throughout.

The six cylinder air cooled Anzani type 6-C is used. Rated horsepower, 55; weight, 154 pounds; propeller, 7 feet in diameter.

Fuel sufficient for three hours at full power can be made to last for an additional hour if the engine is throttled down to 40 H.P. This should be taken into consideration when the fuel weight is considered to be sufficient for three to four hours.

General Specifications

Span, upper plane....28'-0"
Span, lower plane....21'-5"
Chord, upper plane....4'-6"
Chord, lower plane....2'-9"
Total area....184 sq. ft.
Length over all....18'-6"
Weight, machine empty....470 lbs.
Useful load....510 lbs.

Useful load 510 pounds

2 passengers....300
Fuel for 3 hours....110
Load or additional fuel....100

(*Performances*)

Speed range, M.P.H....97-41
Minimum H.P. required for horizontal flight....14
Rate of climb, first minute....600 ft. per min.

Useful load 400 pounds

2 passengers....300
Fuel for 3 hours....100

(*Performances*)

Speed range, M.P.H....99-38
Minimum H.P. required for horizontal flight....11
Rate of climb, first minute....780 ft. per min.
Climb in 10 minutes....6,000 ft.
Climb in 15 minutes....7,500 ft.
Climb in 27 minutes....10,000 ft.

Useful load 250 pounds

Pilot....150
Fuel for 3 hours....100

(*Performances*)

Speed range, miles per hour....101-34

(*Continued on page* 304)

THE GEORGES LÉVY FLYING BOAT

(*Continued from page* 286)

Hull

The hull is braced by light wooden members which are quite fragile and it has been necessary to put in a floor to protect the most used parts; that is to say, those parts occupied by the pilot and observer. The flooring is removable for the purpose of inspecting the bottom of the hull. In the compartment to the rear of the pilot's cockpit is found a 4 mm. 7 bracing cable which must be kept in careful adjustment.

Controls

The aileron control cables run to the rear center section strut. This is made necessary by the fact that the wings fold back at this point. Elevator and rudder controls run from a single outlet in the top deck of hull just aft of the propeller. None of the control wires should be allowed to slacken, as loose cables are liable to become jammed. All parts of the control system should be well greased to obtain ease of control.

Engine Controls

The triple quadrant placed to the right of the pilot is the throttle. The largest handle to the left is that controlling the gasolene supplied to the engine. The second controls the air correction by altimeter. The third is the ignition switch and used only at the beginning of a flight.

An auto lock on the lower left-hand side controls the oil tank shut-off; another at the right controls the gasolene tank.

The five-point switch, type S. F. A., is fixed on a small board designed to receive the instrument board.

All engine controls passed through bowden sheathes and it is well to pour a little heavy oil into the sheathes from time to time.

Piping

Gasolene is contained in three tanks of 140 liters each, fixed to the inside of the hull and supported as high as possible by means of wooden supports and steel spring rings. A small trap in the hull gives access to the filled cap.

Each reservoir has two outlets, the upper one for the overflow and the other for the gasolene which is pumped up. Each outlet and collecting tubes are furnished with a shut-off valve located upon the bridge of the hull.

Shunting from the automatic gasolene pump is arranged a pipe passing to a hand pump designed to fill the small gravity tank at departure. The small tank will supply the engine in case the automatic pump fails.

Special rubber joints are used, for it is necessary to have the ends of copper tubes touch in such a way as to avoid the obstructions caused by the inflation which takes place when rubber comes in contact with gasoline.

General Maintenance

The varnish of the hull, floats and struts should be cleaned without injury by means of a cloth saturated in flaxseed oil, with which is mixed several drops of ammonia. Cables should be rubbed with pure flaxseed oil or with fresh grease. Wings should be lightly washed with a sponge and soapy water.



The Georges Lévy two-seater flying boat "Alert," with a Hispano-Suiza engine

PROPERTIES OF REPRESENTATIVE AMERICAN LUBRICATING OILS FOR USE IN INTERNAL COMBUSTION ENGINES

Kind of Oil	Physical Properties Fresh Sample								Lovibond Color		Vacuum Distillation	Oxidation Oven		
		Flash Deg. F				Viscosity Seconds								
	Baume Grav.	Open Cup	Closed Cup	Deg. F Burn	Deg. F Chill	100° F	150° F	212° F	Fresh	After Heat Test	% Dist. Under 300° C	% Evap. Loss	% Insol.	% Varnish
Aerial Oil	29.1	425	410	490	50	593	176	71	550–2	670–2	13	18.98	0.0240	0.1875
Amalie Special	31.0	420	425	490	40	209	80	43	430–6	500–2	4	31.71	0.0220	0.3300
Atlas Aerul Heavy	27.6	460	460	540	47	868	228	85	400–½	600–½	328° I.B.P.	17.84	0.0120	0.1081
Cadillac Detroit Lt	29.2	405	.....	470	11	190	69	.....	300–6	.....	44	.....	.....	.....
Duplex No. 350	30.7	425	435	495	27	194	77	46	240–8	250–2	1	21.49	0.0596	0.1760
Havoline														
Light	25.9	370	380	430	33	173	66	42	540–8	300–½	22	62.93	0.5500	0.6300
Medium	25.0	385	395	450	34	237	80	46	570–2	500–½	6	57.74	0.8600	0.3400
Heavy	25.6	395	410	455	46	361	111	54	480–2	300–½	18	40.49	0.1500	0.2800
Mobiloil														
Zeta Light	28.0	375	380	430	31	141	62	42	360–6	200–½	28	51.75	0.3010	0.3816
Zeta Medium	24.2	400	410	470	43	255	84	47	460–2	300–½	29	35.06	0.2509	0.2776
Zeta Heavy	25.6	420	425	480	42	476	137	62	500–½	650–½	301° I.B.P.	27.64	0.0404	0.2339
"E" Light	28.1	370	380	420	00	167	66	44	430–8	400–	21	76.44	0.1962	0.1580
"A" Medium	21.8	360	360	420	24	330	97	49	660–2	320–½	21	57.66	0.6381	0.1612
"B" Heavy	26.3	500	470	580	41	1040	397	122	800–½	950–½	3	25.26	0.1766	0.1500
Arctic Lt. Med	23.3	370	380	425	6	221	74	45	280–6	400–2	28	71.52	0.3993	0.4759
Arctic Medium	21.1	370	585	430	8	300	87	46	550–6	210–½	19	49.08	0.4160	0.5065
"BB" Med. Heavy	25.8	460	.....	540	46	926	243	86	670–½	800–½	344° I.B.P.	18.67	0.0290	0.0560
Monogram														
Light	27.6	360	360	410	20	140	60	41	200–6	260–2	14	57.12	0.4600	0.6700
Medium	26.0	375	370	430	23	289	95	50	600–6	250–½	16	46.19	0.1600	0.2600
Heavy	28.9	430	445	505	34	340	108	55	600–6	580–2	308° I.B.P.	25.75	0.0700	0.3600
Ex. Heavy	24.7	465	425	535	58	1583	356	110	330–½	470–½	3	12.10	0.0440	0.2056
Oilzum														
Heavy	29.1	430	440	500	30	261	91	50	460–6	420–2	310° I.B.P.	15.86	0.1167	0.1357
Crystal G.E. Oil	17.6	505	490	590	2	1080	244	83	100–8	140–2	.....	17.54	.....	.....
Perfection														
"A" Light	29.1	400	410	470	26	181	71	45	420–6	430–2	314° I.B.P.	49.36	0.1378	0.2387
"B" Medium	24.9	390	400	450	32	243	81	47	440–2	480–½	2	52.33	0.3704	0.2629
"C" Heavy	29.3	420	430	495	40	316	103	54	480–2	300–½	2	27.53	0.0088	0.2292
Polarine, New Jersey	24.6	395	.....	470	6	221	77	42	150–6	850–2	57	48.73	0.6200	0.4300
Quaker State Medium	28.8	440	450	520	21	301	102	48	600–6	700–2	29	22.42	0.0640	0.1700
Service Auto Oil	24.3	390	.....	460	33	195	72	44	500–2	440–½	7	28.91	0.9600	0.4100
Socony														
Zero	24.3	395	410	470	Si at o	219	77	46	140–6	250–2	3	42.85	0.1531	0.2167
Polarine Heavy	25.4	385	380	450	35	300	103	51	380–2	420–½	7	38.61	0.1353	0.2128
Supreme														
Light	22.3	325	315	360	Si at o	137	57	39	420–6	250–2	73	60.21	0.7689	0.3531
Medium	19.8	330	330	380	Si at o	217	73	43	530–6	220–½	49	56.57	0.7041	0.3243
Heavy	19.4	330	330	370	o at o	242	73	44	580–6	200–½	42	54.37	0.4509	0.3063
Texaco														
Light	21.3	335	340	380	Si at o	205	69	42	190–8	260–2	44	56.13	0.1395	0.2371
Medium	20.9	350	350	400	Si at o	301	85	46	190–8	350–2	31	31.40	0.1009	0.2163
Heavy	19.3	356	360	420	10	495	119	51	330–6	450–2	19	42.87	0.0874	0.2097
Ursa	19.7	390	365	455	Si at o	735	153	58	240–6	360–2	.....	37.63	0.2757	0.3562
Valvoline Medium	30.7	385	390	440	30	257	93	51	480–2	300–½	29	38.85	0.0250	0.1714
Veedol														
Aero No. 1	26.2	455	450	535	39	795	212	78	580–2	300–½	3	34.96	0.3956	0.1504
Aero No. 2	27.1	450	445	530	38	814	222	80	580–2	310–½	3	36.58	0.1614	0.1900
Aero No. 3	26.3	435	435	520	38	517	149	63	470–2	260–½	310° I.B.P.	37.98	0.0358	0.1738
Aero No. 4	27.6	440	430	515	34	513	151	64	500–2	250–½	3	38.11	0.0416	0.2130
Aero No. 5	24.7	440	450	520	28	413	135	55	470–6	580–2	336° I.B.P.	38.83	0.0741	0.4151
Aero No. 6	24.7	460	460	540	27	474	134	58	480–6	550–2	310° I.B.P.	18.91	0.0732	0.2284
Zero Light	26.1	390	.....	460	14	199	75	44	380–6	370–2	57	39.56	0.4548	0.2717
Medium	26.3	405	.....	475	30	250	88	48	530–6	520–2	23	49.54	0.0201	0.2348
Heavy	26.2	410	.....	480	33	329	107	52	700–6	650–2	28	30.80	0.0650	0.1719
Extra Heavy	26.1	465	.....	550	44	.....	355	111	210–½	450–½	3	90.2	0.0464	0.1155
Waverly	31.0	400	405	450	24	160	69	40	300–6	570–2	37	44.76	0.1400	0.2900
White Star Motor Oil	25.8	360	370	415	18	170	66	43	500–6	800–2	17	59.63	0.4800	0.7500
Wolf's Head														
Light	31.2	390	.....	445	34	142	62	40	130–6	210–2	1	58.70	0.1750	0.4800
Medium	28.8	410	.....	470	26	223	82	46	410–6	350–½	310° I.B.P.	45.05	0.3800	0.2700
Heavy	28.6	415	.....	475	32	334	108	52	480–6	750–2	394° I.B.P.	35.50	0.2100	0.2000
No. 8	27.6	485	460	550	46	1196	300	100	680–6	380–½	3	38.83	0.0470	0.2960

THE MANUFACTURE OF GOODYEAR FABRIC AND BALLOONS

By HERMAN T. KRAFT

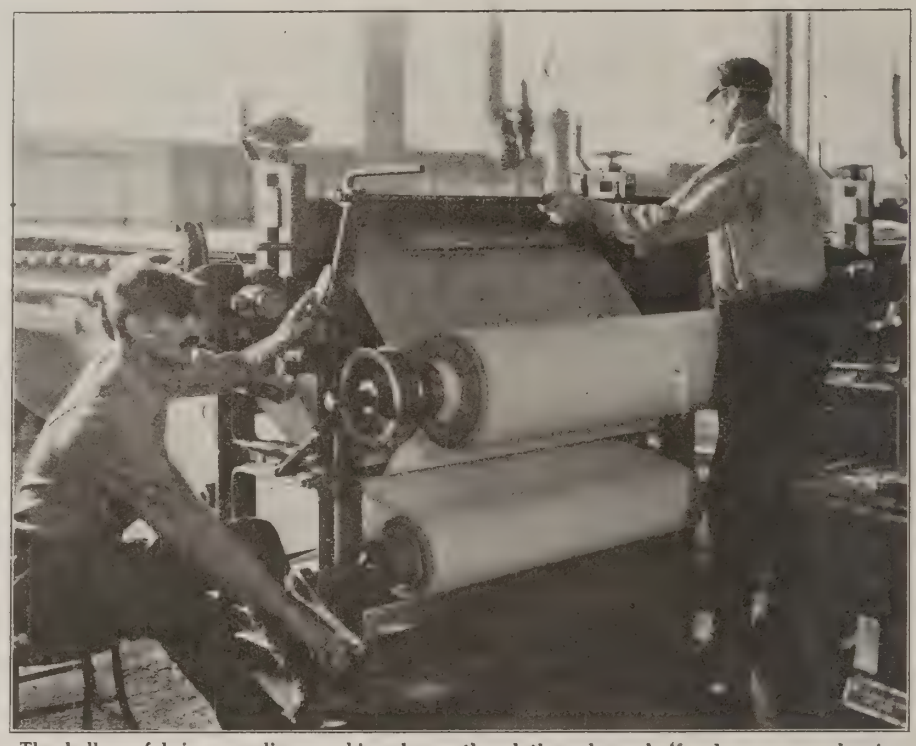
Asst. Aeronautical Engineer, the Goodyear Tire & Rubber Company, Akron, Ohio

HOW is a balloon made? From the average group of people, the answers to this question would be many and varied. Many—because almost everyone is interested in a general way in aviation (there is a romance about it that appeals to the imagination); varied—because so few people have any real conception of the various processes and steps necessary in the manufacture of a balloon.

The first step of all is to secure a very high grade of cotton cloth necessary to make a perfect balloon fabric. This cloth must be very finely woven and must be very strong for its weight. In the case of Goodyear balloons, this cloth is made of the best grade of long, staple sea island cotton procurable and is furnished in two weights, 2½ oz. per square yard and 4¼ oz. per square yard. These two special balloon cloths are the last word in high grade cotton materials, and are subject to numerous and rigid inspections in order to keep their standard at the highest.

The cloth comes in rolls of 150 yards each and is placed upon inspection tables having a plate glass top highly illuminated on the under side by large electric lamps. The material passes over these tables at a very slow speed which permits the inspector to detect any slugs, heavy places in the cloth, or other irregularities that may cause a leakage in the gas bag. These are cut out and such material is either scrapped or used for producing small parts that do not require gas tightness or strength. The inspection is kept very rigid in order to eliminate the possibility of any even slightly defective material reaching the Spreading Department and ultimately the Production Department.

The next operation is the spreading of the fabric. This is done by a machine which draws the cloth under a knife edge scraper. Piled up against the front side of this scraper or knife is a mass of plastic rubber or dough. The knife is arranged to press down on the cloth at a great pressure, so as to allow only a very small portion of the gum to scrape through and remain deposited on the cloth; in fact, so small a deposit is made that it is necessary to pass a cloth under the knife as many as thirty-two times before the amount of rubber deposited reaches a final total of only 4 oz. per square yard. The reason for this tedious proces is that by spreading onto cloth a given weight of rubber in as many thin films or layers as is possible, a more gas-tight fabric is obtained than by putting the rubber on in four or five thicker layers.

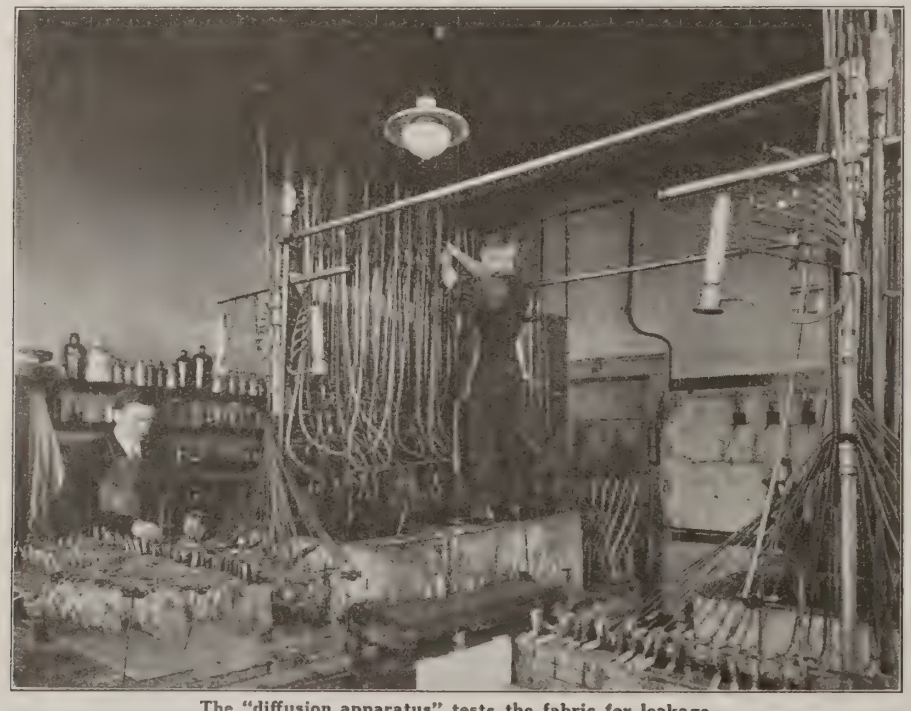


The balloon fabric spreading machine draws the cloth under a knife-edge scraper, leaving only a small proportion of gum in the fabric

Next in sequence is the doubling operation—that is, putting the two plies together. To prepare for this operation, the outside ply has to be cut into 45° angle blocks of such a width that when they are swung around and cemented together on their selvage edges, a standard width roll of cloth is again formed. Only now the threads in the cloth run at an angle of 45° to the edge whereas before they ran parallel and perpendicular to the edge. Now by doubling together this bias ply with a regular straight ply, a balloon fabric is obtained having threads running in eight different directions instead of four. This gives a beter average strength in all directions and, more important still, prevents ripping in any one direction. For if a tear starts along the warp of one ply, it is stopped by both the warp and fill of the other ply.

The fabric is now ready to be cured. This is done by wrapping the freshly spread balloon fabric on a large iron drum and placing it in a large cistern-like steel containers into which steam can be turned so as to obtain any temperature desired. Cures of this material vary up to one and one-half hours at various temperatures.

Upon withdrawing the fabric from the heater, it is ready for another inspection and is passed through a dusting operation which deposits a powder on the surface of the fabric to eliminate any tendency the surface plies may have to stick together. Disks 12″ in diameter are then cut from



The "diffusion apparatus" tests the fabric for leakage

the roll at various points and sent to the Chemical Laboratory for diffusion tests. This test consists in placing a disk of fabric in a gas-tight drum so as to form a complete partition across the interior of the drum. Hydrogen is passed into the drum on one side of this partition and the leakage through the sample disk is measured after a given period to determine the exact leakage per square meter. At 30 millimeters pressure, this runs approximately at 12 liters per square meter every 24 hours. This means that with a full size balloon, the leakage due to diffusion is less than ½% per day of the total volume of the balloon. Having satisfactorily passed the diffusion tests, the material is again thoroughly inspected both by Government inspectors and by our own inspectors, and is then passed on to the Production Department to be cut up into patterns and made into balloons.



The cloth inspection racks are equipped with brilliant electric lights which show up any defect

It is here that the importance of the Design Department is first seen. No two panels or rings of fabric in a dirigible balloon are the same. The dimensions and the shape of the patterns for these panels have to be figured out to the utmost mathematical precision. This is done by the Design Department and the patterns are then furnished the Production Department in paste board form. The fabric to be cut is laid out on long tables, and marked according to the size and shape of these forms. When a large number of balloons of the same size are being built, as many as thirty-two duplicate patterns can be cut at one time by laying up thirty-two layers of fabric one above the other and marking on the top layer the pattern desired and cutting the entire thickness of fabric in one operation with an electric cutting machine.

After the patterns have been cut, the next step is to cement them together. The cementing operation takes place first where two patterns or pieces of fabric are cemented together on a ¾" lap, after which the twin needle sewing machine unites these pieces together firmly. The seams thus formed are then cemented on both sides and covered by balloon tape. In this way, the holes made by the sewing operation are sealed and hydrogen leakage through the seam is reduced to a minimum. All these operations are carefully inspected, and in no case do we permit careless sewing or unsatisfactory cementing, as these are the most important operations in the manufacture of a balloon. A defective seam in a balloon may be likened to a weak link in a chain. Speaking non-technically for the sake of comparison, we may say, "No balloon is stronger than its weakest seam." That our seam workmanship has been perfect is borne out by the fact that we have never had a sewed and taped balloon burst at a seam.

The balloonets or air bags of the balloon are inserted before the final assembly is made. It is quite a trick to insert a balloonet and we experienced considerable difficulty in doing so on some of our first balloons. However, we have long since overcome this difficulty for we have been producing up to five kite balloons per day and two dirigible gas bags per week without experiencing any trouble from this source.

Upon final assembly of the gas bag, all suspension ropes and cables are attached. These are for the support of the basket in the case of kite balloons, and for the support of the car in the case of dirigibles. The balloon is then sent to the Final Inspection Building which is 200 feet long and 100 feet wide, and has a vertical clearance of approximately 60 feet, being large enough to enable six kite balloons or three dirigibles to be fully inflated at one time. Here men crawl into the balloon through a manhole to make the final inspection and attach such small accessories as may be more readily inserted in this manner. The balloon is given a thorough inspection which often takes several men ten to twelve hours. All small pin holes or light places of small proportion in the fabric are reinforced with a patch, even though no leakage may be apparent, so as to assure that after constant use no weak places will develop. On completing this inspection, the balloon is deflated, rolled up and placed in a large canvas packing case which in turn is placed in a shipping trunk for domestic or overseas delivery. In the case of dirigibles, after the final air inspection, the gas bag is usually sent out to the Air Station ten miles from our factory, where the largest hangar in the United States is located. Here the gas bag is inflated with hydrogen, the car is suspended under the gas bag and all flying adjustments are made. In about a week, the dirigible is ready to fly, at which time Government officials are called from Washington to act as a Board of Acceptance in passing upon the performance of the dirigible in its trial flights.

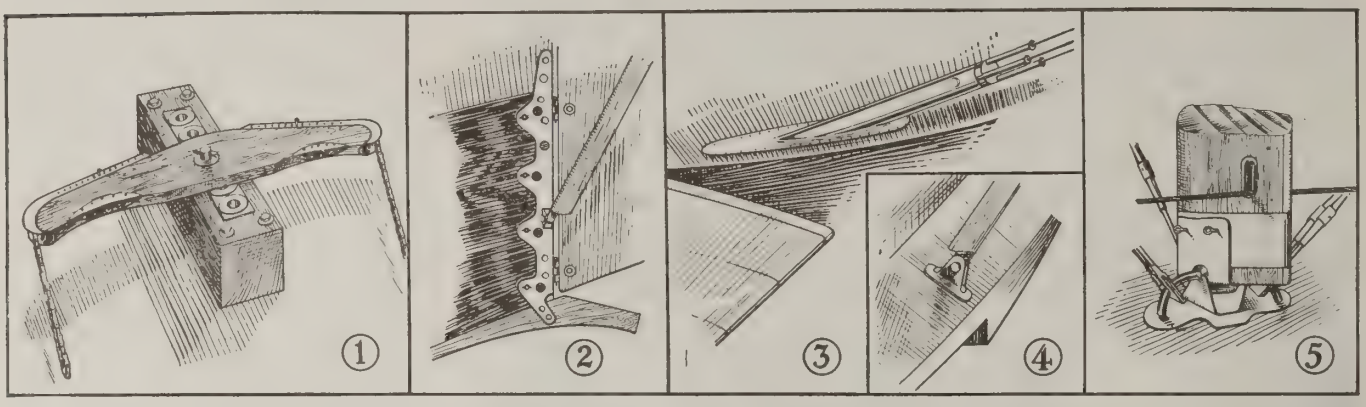
Thus we have followed the manufacture of balloons from the receipt of the raw cloth to the demonstration of the completed balloon. Due to the balloon industry being really in its infancy, radical changes in design are being made from time to time, but the production procedure outlined in this article may be said to be standard. The development of the balloon is more a question of design than production. So far, the largest dirigibles produced have been ships of 2,500,000 cubic foot capacity, with an estimated endurance at 45 miles per hour of slightly over two hundred hours. However, we have information to the effect that a 10,000,000 cubic foot ship is being designed that will be 1,200 feet long, 150 feet in over-all height, which will have a cruising range of 20,000 miles and be able to stay aloft for three weeks without requiring refilling. This gives a forecast of what the future holds in the way of aerial transportation by dirigible.



The assembling room, where balloons are put together

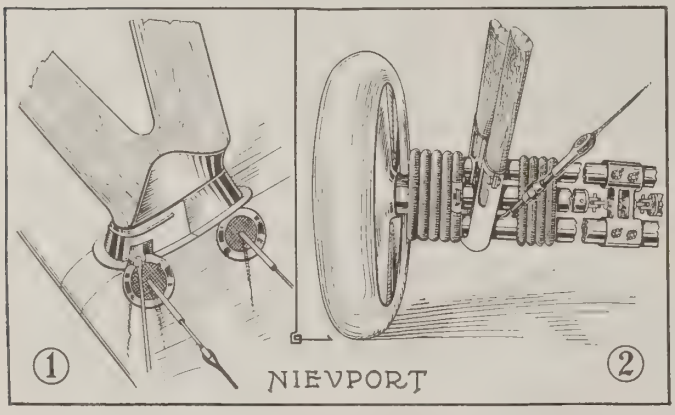
SOME DETAILS OF MODERN AEROPLANES

THE CURTISS M-F SPORTSMAN'S FLYING BOAT



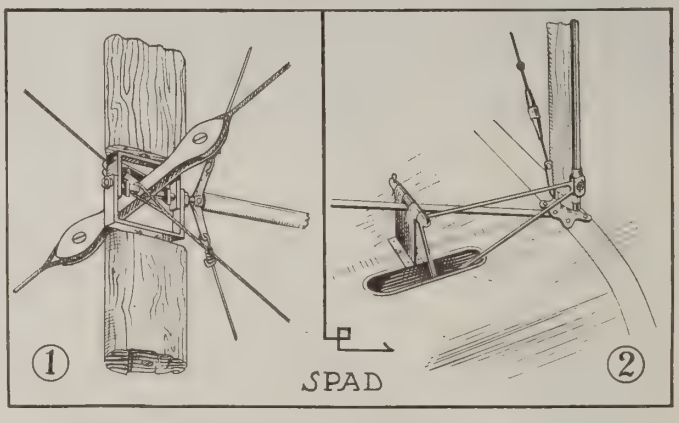
1—One of the foot rudder bars, showing the adjustable pivot and means for taking up the slack by means of the bicycle chain terminal for the control cables. 2—Termination of the boat hull, showing the stern plate, stabilizer brace, keel skid, etc. 3—The aluminum tube outlet for control cables in the top side of hull. Two of the cables are for the left elevator and the third for left side of the rudder. A similar outlet is placed on the right side of the hull with a corresponding set of cables. 4—Socket fitting on the planing fin for brace to the lower wing. 5—The lower end of an inner interplane strut. The strut is attached to the fitting by means of a pair of cotter pins. The aileron cable is run through the strut, a metal bushing protecting the strut from wear.

NIEUPORT SCOUT



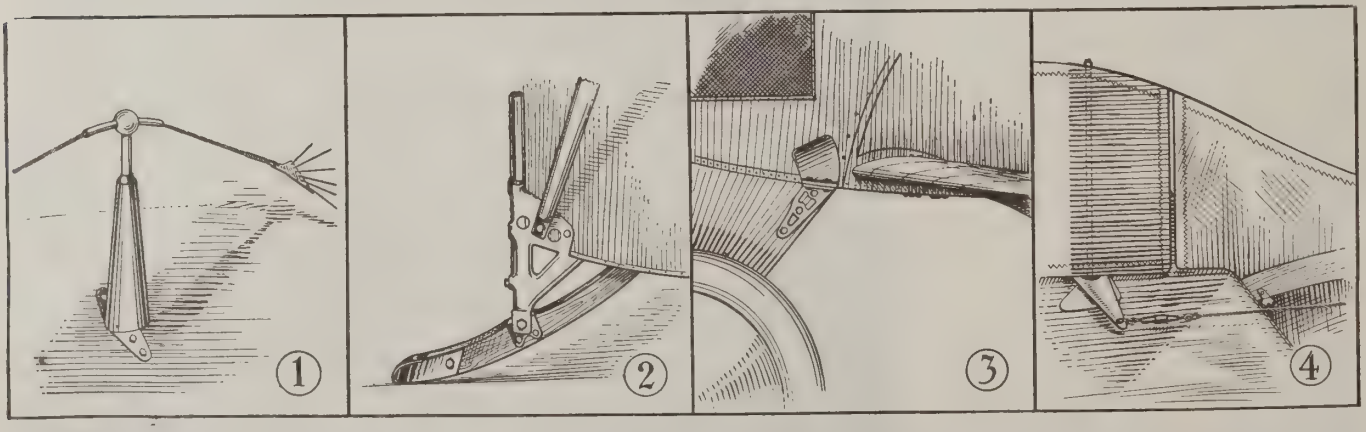
1—The attachment of the landing and drift cables at the bottom of right interplane V strut. The socket is covered in by an aluminum casing and rubber disks provided where cables go through the plane. 2—Landing gear shock absorber arrangement. Streamline aluminum tubing is used for the landing gear struts. The axle is hinged at the center

THE SPAD SCOUT



1—Cable crossing at middle of intermediate interplane strut. A steel rod faired with spruce runs from front to rear strut with solid steel wire bracing between. 2—The walking-beam lever arrangement for actuating the aileron of the upper right plane. A transverse rod running from the plane works a light vertical strut, the section of which is continuous with the interplane strut

THE CHRISTMAS "BULLET" STRUTLESS BIPLANE



1—Cable guide post on stabilizer. The post is fixed and the rear end of the stabilizer is flexible, the separate elevator being done away with. 2—Stern post and tail skid. The tail skid post is continuous with the fuselage stern. The metal fitting is of sheet steel, nickle plated. 3—Attachment of landing chassis and lower main plane to the fuselage. The main beams of the lower plane run over the fuselage longerons and are clamped thereto by means of a pair of 4-bolt 2-plate fittings. 4—Rudder tiller and pivot arrangement. The rudder is balanced and the top of pivot rod supported by a flat metal strap, which is screwed to the vertical fin

SECOND PAN-AMERICAN AERONAUTIC CONVENTION AND EXHIBITION

To Be Held Under the Auspices of The Aero Club of America, The Aerial League of America and the Pan-American Aeronautic Federation.

From Thursday, May 1st, 1919,
to
June 1st, inclusive,
at
Atlantic City, N. J.

Intercollegiate Contests Throughout the Summer

CONTESTS TO BE HELD EACH SATURDAY

(1) Seaplane Contests (general),
(2) Curtiss Marine Flying Trophy and Prizes,
(3) Intercollegiate Seaplane Contests,
(4) Land Aeroplane Contests,
(5) Dirigible Contests,
(6) Kite Balloon Speed in Ascending and Descending, and Maneuvering Contests,
(7) Parachute Competition,
(8) Aviette (bicycles and motorcycles with wings) Contests.

EVERY DAY ACTIVITIES

(1) Exhibits of Aeroplanes, Motors and Accessories on the Steel Pier,
(2) Demonstrations and tests of Seaplanes, Land Aeroplanes, Motors, Dirigibles, Kite Balloons, to prospective purchasers and representatives of different governments,
(3) Aerial Passenger Carrying by seaplanes and dirigibles, and kite balloon ascensions,
(4) Moving pictures and Addresses by leading authorities on most important phases of aeronautics.
(5) Competition for the Pulitzer Trophy.
(6) Competition for the Atlanta Journal Trophy.
(7) Competition for the Curtiss Marine Flying Trophy.

The Governments and Aeronautic, Sporting, Scientific, Industrial and Civic organizations of the United States and all the countries in the world, excepting Germany and her allies, are invited to send representatives to attend this great aeronautic event. On arrival in the United States these representatives should call at the Headquarters of the Convention Committee at No. 297 Madison Avenue, New York City, to register and receive their official badges and the official program.

In the event that it is more convenient for them to go directly to Atlantic City they will register at the offices of the Convention located at the following Atlantic City hotels: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis and Hotel Haddon Hall.

Representatives of the Convention Committee will be at the Bureaus of the Aeronautic Convention at the above-named hotels and will issue the official badges which admit the bearer to the Aeronautic Hall, as well as the Aero Exhibition on the Steel Pier, the judges' enclosure during contests, and to the Aerodrome and seaplane stations where the aircraft and motors will be demonstrated.

All communications until May 1st should be addressed to Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

Entries for the contests should be addressed to the Contest Committee, Aero Club of America, 297 Madison Avenue, New York City.



DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

THURSDAY, MAY 1ST

Opening of Convention and Exhibit.

AFTERNOON—Reception at Aeronautic Hall on the Steel Pier. Addresses by United States Government State and aeronautic authorities.

EVENING—Aero Show and addresses by officials.

FRIDAY, MAY 2ND

AFTERNOON—Aero Show. Preliminary tests of seaplanes, dirigibles and kite balloons.

EVENING—Moving pictures and address on flying for sport and pleasure.

SATURDAY, MAY 3RD

AFTERNOON—Seaplane and dirigible races, and kite balloon ascending and descending contest.

EVENING—Ball.

SUNDAY, MAY 4TH

MORNING—Memorial service by eminent Divine for the dead airmen.

AFTERNOON AND EVENING—Reception to allied aces and heroes of the air and their parents, and announcement of the award of the Aero Club of America Medal of Valor, and the Aerial League of America Diploma of Honor.

MONDAY, MAY 5TH

AFTERNOON—First parachute contest for $500 Bennett Prize.

EVENING—"The Large Dirigible and Its Value for Transportation." Representatives of railroads, express, steamship and other transportation organizations invited to attend.

TUESDAY, MAY 6TH

AFTERNOON—Illustrated addresses on "Aerial Forest Patrol." Forestry Department of every State invited.

EVENING—"Work of Aerial Police Squadrons, and Why Every City Should Have One."

WEDNESDAY, MAY 7TH

AFTERNOON AND EVENING—Aerial Mail Day. Illustrated address on, and consideration of, "Aerial Mail Planes." Chairman of Post Office and Post Roads Committees of House of Representatives and Senate, and Postmaster General Burleson invited to deliver addresses. (26,000 United States Postmasters, and Chambers of Commerce of 13,000 cities invited to attend.)

THURSDAY, MAY 8TH

AFTERNOON AND EVENING—Illustrated addresses on the "Need of Municipal Aerodromes, and the Part to be Played by Aircraft in City Planning." Chambers of Commerce and City Planning Commissions of 13,000 cities invited to attend.

FRIDAY, MAY 9TH

AFTERNOON—Arrival of seaplanes and army planes from Army and Navy Air Stations. Second parachute competition for the $500 Bennett Prize.

EVENING—Illustrated addresses on "Latest Developments in Aerial Warfare and Adventures in Aerial Warfare," told by famous aces.

SATURDAY, MAY 10TH

AFTERNOON—Army, Navy and Marine Corps Day. Aerial contests and tournament.

EVENING—United States Army and Navy Officers' Reception. Reception and addresses at Aeronautic Exhibition Hall on the Steel Pier.

SUNDAY, MAY 11TH

AFTERNOON AND EVENING—Presentation of the flags by each State of the United States to the Aero Squadrons representing the States. Each State will present a flag to each Aero Squadron, the members of which were overwhelmingly natives of that State. The presentation will be made by representatives from the State and the Aero Club and Aerial League branch of that State. All States and cities invited to send delegates, and Army, Navy and Marine Corps to send representatives.

MONDAY, MAY 12TH

AFTERNOON—Demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night." All national advertisers and advertising agents invited to attend.

EVENING—"Pan-American Aerial Transport Over Land." Addresses by members of the commissions of the 20 Latin-American Republics.

TUESDAY, MAY 13TH

AFTERNOON AND EVENING—"Pan-American Aerial Transport Over Water." Addresses by members of the 20 Latin-American Republics' Commissions.

WEDNESDAY AND THURSDAY, MAY 14TH AND 15TH

AFTERNOONS AND EVENINGS—"The Airways and Aerial Transport in Europe, Canada, Africa, Australia and Asia."

FRIDAY, MAY 16TH

AFTERNOON AND EVENING—"Aerial Navigation Instruments for Flying Over Land and Water." Aviators, navigators, scientific instrument makers and aeronautic experts invited.

SATURDAY, MAY 17TH

AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.

EVENING—Extensive exhibit of aerial photographs and photographic apparatus. All photographers, professional and amateur, and makers of photographic apparatus invited.

SUNDAY, MAY 18TH

AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH

AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."

EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH

AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST

AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.

EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22nd

AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Telegraphic and Climatic Factors in Relation to Aeronautics.

FRIDAY, MAY 23RD

AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulation of Air Traffic." (First day.) Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH

AFTERNOON—Races and contests.

EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH

AFTERNOON AND EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK.

MONDAY, MAY 26TH

AFTERNOON—"Aeronautic Engineering Problems and Their Prospective Solution."

EVENING—Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH

AFTERNOON—"Factors That Increase the Efficiency for Large Dirigibles."

EVENING—"Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH

AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."

EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH

AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."

EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)

AFTERNOON—Dirigible races, kite balloon speed ascending contest; parachute contest.

EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST

AFTERNOON—Seaplanes, land planes and dirigible contests. Aviette competition at which all cyclists and makers of bicycles and motorcycles will be invited.

EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST

AFTERNOON AND EVENING—Award of prizes and diplomas for all events.



Aircraft Advertising Agency, Inc.

280 Madison Avenue
New York

Telephone 1556 Vanderbilt
Cable Address: "Aero-Ads"

"AERO-ADS"
by
"AERO EXPERTS"

THE members of the *Aircraft Advertising Agency, Inc.* are all ex-officers of the United States Army Air Service, with both theoretical and practical knowledge in the Aeronautic Field, assuring expert service for clients.

GRANVILLE A. POLLOCK, President of the *Aircraft Advertising Agency, Inc.*, previously to his release from the Army with the rank of Captain, served in the war from its beginning and was a member of the famous "Lafayette Escadrille." In addition to this war aviation service, Captain Pollock is by profession an aeronautical engineer.

S. HERBERT MAPES, Vice-President of the *Aircraft Advertising Agency, Inc.*, is another Air Service Captain who has recently laid aside his uniform after having served in important capacities at various aviation training fields in this country. He is well known as an automobile racer, an exhibitor of saddle horses and a winner of Horse Show Blue ribbons, as well as being a member of many prominent clubs.

REED GRESHAM LANDIS, of Chicago, son of Judge Kenesaw M. Landis, is also a Vice-President of the *Aircraft Advertising Agency, Inc.* Besides having been a Major in the American Air Service, he has the added distinction of being the second ranking American "Ace" with 12 Air Victories to his credit.

WILLIAM MENKEL, Secretary of the *Aircraft Advertising Agency, Inc.*, also served as a Captain in the Air Service, holding various positions at Washington and in the field, including that of Commanding Officer of the Aviation Repair Depot at the Speedway, Indianapolis, Ind. Previously to entering the service, Captain Menkel was for more than 15 years associated with the American Review of Reviews.

The AIRCRAFT ADVERTISING AGENCY, INC. aims to cover the advertising field for aeronautics, including:

DISPLAY ADVERTISING for General Advertisers on Dirigible, Kite, and Spherical Balloons, Aeroplanes, Streamers from Aircraft, and by the dropping of Souvenirs and Handbills from the Air;

PREPARATION of COPY and SKETCHES and the PLACING of ADVERTISING for manufacturers of Aircraft, Accessories, and Aviators' equipment in aircraft and other periodicals.

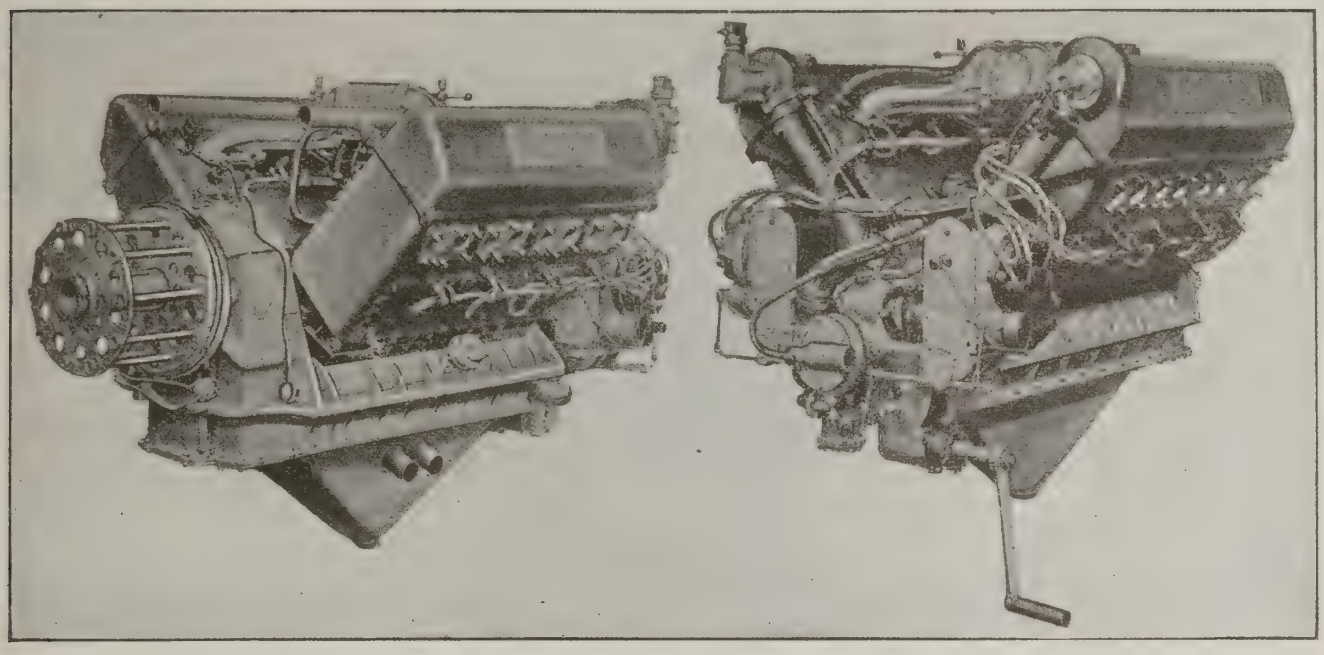
AERIAL PHOTOGRAPHS of Cities, Summer Resorts, Country Places, Real Estate Developments, Etc.

RATES ON APPLICATION.

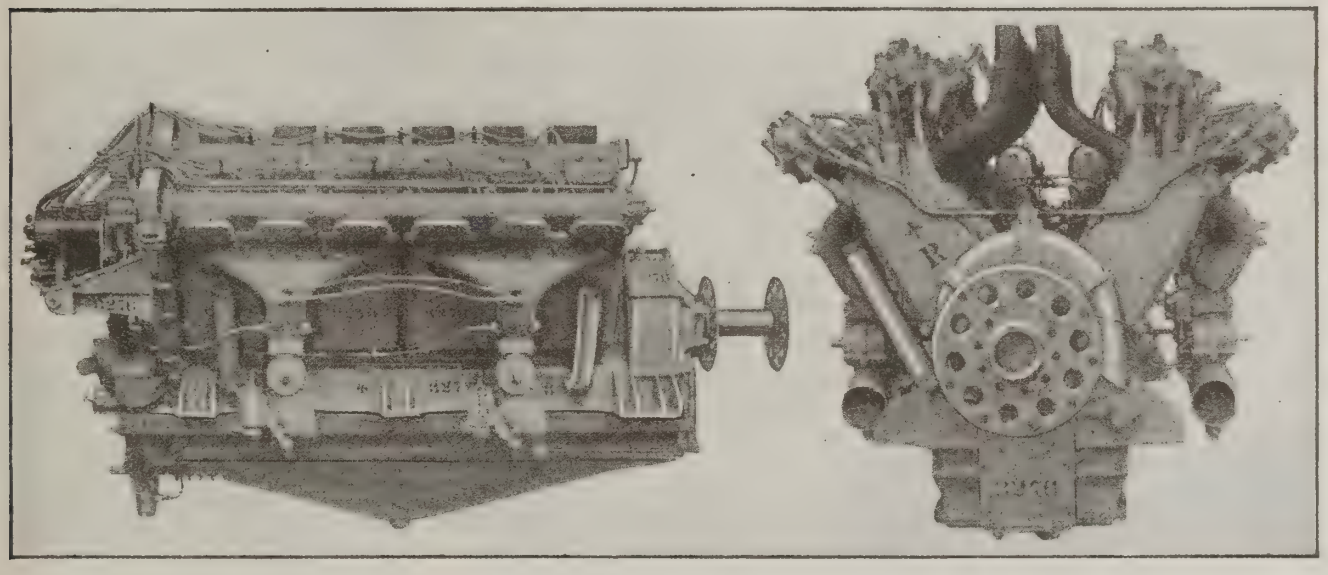
The Aircraft Advertising Agency, Inc. is now booking the space for exhibitors at the **Second Pan-American Aeronautic Convention and Exposition at Atlantic City, N. J., May 1 to June 1, 1919,** and also has charge of the preparation of the elaborate souvenir Program, advertising rates for which may be had on application.

The Aircraft Advertising Agency, Inc. also controls advertising space on Aeroplanes, and kite and Spherical Balloons operating from the permanent Aviation Field at Atlantic City, N. J., and on the 36,000 square feet of Bill Board space on the fence of this Aviation Field.

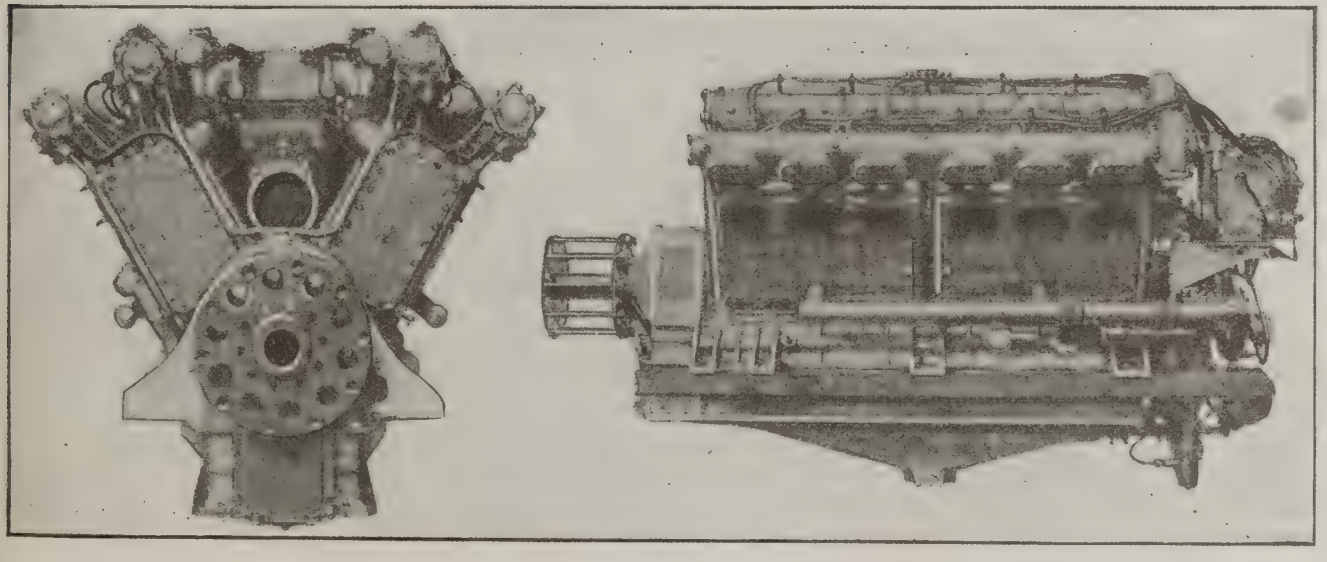
THE SUNBEAM AERO ENGINES



The Sunbeam "Arab" which is rated at 200 h.p.



The Sunbeam "Cossack" 12 cylinder engine rated at 320 h.p.



The Sunbeam "Manitou" engine rated at 300 h.p.

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Olcott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

NOTES

Note 1—Report to places mentioned in the order named.
Note 2—Report to Judge Advocate General for duty in that department.
Note 3—Report to District Manager Aircraft Finance, Detroit, Mich.
Note 4—Report to Chief of Aeronautical Engineering Division, Dayton, Ohio.
Note 5—Report to Fox Hills, Staten Island, N. Y., to U. S. Army General Hospital No. 41.
Note 6—Report to Camp Grant, Ill., to Director of Purchase, Storage and Traffic.
Note 7—Report to District Manager, Aircraft Finance, Chicago, Ill.
Note 8—Report to 921 Hume-Mansur Building, Indianapolis, Indiana.
Note 9—Report to Ayer, Mass., to Camp Devens, for duty in the base hospital.

Special Orders Nos. 76 to 82 Inclusive

B

Baxter, Walter T.....PFO
Biggs, Reuben D.....Note 4

C

Carter, William R.....PFO
Carberry, Joseph E.....RSD

D

Dolan, Charles H., Jr.....DAP

E

Eich, Charles P.....Note 9

F

Forshay, Harold J.....Note 4

G

Gladish, David F.....PFO
Gabriel, William C.....Note 6

L

Larned, Elmer .....Note 7

M

McCue, John B.....Note 5
McDonald, Thaddeus L.....PFO

O

Oakes, Nathan P.....Note 13

P

Praether, J. Allen.....Note 6
Perry, Ralph W.....BFT
Penick, William N.....Note 8

R

Rowe, Charles B.....Note 3

S

Sisson, Benjamin F.....PFO

W

Waller, John R.....Note 2
Wise, George T.....AGC

Recent Naval Orders

Lieutenant (junior grade) John O. Strickland, to Chatham, Mass., report to commanding officer Naval Air Station for ground duty.

Lieutenant (junior grade) Edward Webb to Hampton Roads for ground duty U. S. Naval Air Station.

Lieutenant Frank Simpson, to duty naval air station, Key West, Fla.

Commander Robert W. Cabaniss, to duty in command naval air station, Rockaway Beach, L. I.

Lieutenant (junior grade) Henry Frederick Henley to duty commandant Naval Air Station, Pensacola, Fla., for duty as commanding officer the S. C. No. 112.

Captain Thomas T. Craven, to office of operations (aviation), Navy Department.

Lieutenant (junior grade) Burr L. Moulthrop, to duty navy air station, Montauk, L. I.

Lieutenant (junior grade) Ralph H. Norris, to duty navy air station, Rockaway, L. I.

Navy Flyers Credited With Twelve U Boats

Boston.—French records credited United States naval flyers with having damaged and possibly destroyed twelve German submarines, according to Captain Thomas C. Craven, U. S. N., commander of all the United States naval aviation forces in France, who returned on the transport Agamemnon on April 7. His department, he said, took a more conservative view and conceded the sinking of two and the damaging of eight enemy craft. Captain Craven described the rapid growth of the United States air forces in France from nine small seaplanes to a great fleet, operating from a port near Brest with more than 200 battle seaplanes of the best type.

Colonel Kenly in Charge of All Army Recruiting

Col. William L. Kenly, formerly Major-General in command of the nation's air forces, and later reduced to his present grade and restored to the artillery service, has been appointed commanding officer of all the recruiting camps and offices in the United States. Col. Kenly's immediate duties will consist of bringing the regular army of the country up to the prescribed strength of 156,000.

In order to accomplish his mission, Col. Kenly will visit the twenty-six camps scattered about the country within the next six weeks.

Naval Fliers on Second Lap of Panama-Key West Flight

Panama, April 13.—Lieutenants Otto and Barker and Mechanician Hornby, attached to the United States Naval Air Station at Colon, landed on April 12 at Bluefields, Nicaragua, after completing the first lap of their flight from Panama to Key West in five hours in a Curtiss flying boat. The distance already covered is 365 miles.

A start was made later for Havana, the second scheduled stop, which lies 800 miles north of Bluefields. The distance from Havana to Key West is 100 miles.

New Reserve Military Aviators Designated

The following named officers, having completed the required tests, are rated as Reserve Military Aviators:

Major Samuel M. Strong, Captain Albert M. Wilcox.

First Lieutenants: Rex E. Field, Charles W. Martin, George K. Thomas, George W. Rogers, Frank W. Cawthon, George B. Fredell, Andrew J. Yarrell, John P. Stone.

Second Lieutenants: Benjamin D. Harrison, Lawrence F. Kraft, Thornton C. Morrow, Richard F. Shaw, Lewis R. Trezona, Alfred R. Coningsby, Anthony J. Kerin, Elmer C. De Montel, Charles R. Rowland, Robert W. Patterson, Harvey C. Waugh, Roderick N. Ott, Richard P. Minor, Isadore Robinson, Jesse J. Gee, Matthew M. Sullivan, Howard N. Tandy, Louis T. Barry, John Preston Richards.

Few Fliers Accident Victims in War

Washington, D. C.—An examination of official figures reveals that only 8 per cent of Air Service casualties were the result of accidents.

Casualties during the period of the war in the U. S. Air Service flying personnel with the American, British, French and Italian armies are shown by types in the following table:

	Number	Per cent of Total
Killed in combat	171	31
Prisoners	135	24
Wounded	129	23
Missing	73	13
Killed in accident	42	8
Miscellaneous	4	1
Total	554	

Navy Tests New Devices for Running Down "Subs" from Planes

Atlantic City, April 5.—The Government, through Navy aviators and submarine specialists, is trying out some new devices for spotting submersibles from the air and for communicating between two types of craft at Fenwick Island Light, near Cape May, according to reports received recently.

Experiments are kept under cover, patrols carefully watching against interruption of observation by outsiders. New uses of wireless in maneuvers, including guiding of submarines by operators in seaplanes, is said to be one of the experiments with which Navy men have had great success during the past week. There are two high ranking officers in the party.

Figures Prove Allied Pursuit Planes More Efficiently Designed

The following comparison shows the average performance of the five best known types of Allied pursuit planes in use at the front during the last months of the war, with the average performance of the five leading types of German pursuit planes:

Average Horsepower	
Allied	186
Enemy	160
Average Pounds Weight per Horsepower	
Allied	9.3
Enemy	12.5
Average Feet per Minute Climb to 6,500 Feet	
Allied	1140
Enemy	705
Average Miles per Hour at 6,500 Feet	
Allied	126
Enemy	109

Transport Otsego Brings Five Balloon Companies

The transport Otsego sailed from Bordeaux April 4 and is due at New York with the following troops: Detachment 19th Balloon Company, 4 officers, 88 men; 20th Balloon Company, 5 officers, 168 men; 30th Balloon Company, 5 officers, 170 men; 35th Balloon Company, 2 officers, 165 men; 36th Balloon Company, 4 officers, 170 men, and 45th Balloon Company, 5 officers, 163 men.

Pershing Commends Balloon Companies

The new list includes a letter of commendation to the Balloon Companies of the First Army, A.E.F., from the Commanding Officer of the First Pursuit Group, Major H. E. Hartney, who thanked the Balloon Companies for the valuable assistance in operations and in confirming victories of the First Pursuit Group.

The Commanding General of the Fifth Army Corps commended the Corps Balloon Wing, advising that Balloon Companies Nos. 6, 7, 8 and 12 of the Fifth Army Corps are commended for their work, beginning November 1, by Major General C. P. Summerall.

The 2d, 7th, 8th and 12th, 24th, 25th and 44th Balloon Companies and the Balloon Schools at Meucon and Souge have also been commended for their service.

Demobilization of Air Service

(Prepared by Statistics Branch, General Staff, War Department.)

Department of Military Aeronautics

According to reports received from the Division of Military Aeronautics the net decrease in the total commissioned and enlisted strength, from the date of the armistice to March 6 was 48 per cent.

The following table shows the distribution and per cent of net decerase to March 6. The strength figures include only officers and men not yet ordered discharged; they do not include men at demobilization camps awaiting discharge.

	Nov. 11	Mar. 6	Per cent of net decrease
Cadets	5,775	1,285	78
Officers	18,688	7,078	62
Enlisted men	133,644	73,223	45
Total	158,107	81,586	48



Lieut. Fred A. Tillman, son of Representative Tillman, has returned to Washington, wearing the medal of the Legion of Honor, the Croix de Guerre and the Distinguished Service Medal

Aeroplanes in Recruiting Service

As part of the whirlwind campaign inaugurated by the army for enlisting its new peace forces, from air stations all over the country recruiting parties are to sally forth in aeroplanes. Practically every town of any size in each territory will be thus visited, and residents may expect at any time from now on to be visited by bird men dropping from the skies to lay army opportunities before the young men of the locality.

Col. Miller, commanding the air service station at Hazelhurst Field, Mineola, L. I., is planning, with the aid of local recruiting officers, to give New Yorkers some spectacular demonstrations of recruiting by aeroplane.

Lieutenant Bernheimer to Get Belgian Order of Crown

Lieutenant Louis G. Bernheimer, son of Mr. and Mrs. Sidney Bernheimer, No. 138 East Seventy-second Street, New York, already possessor of the Distinguished Service Cross with two oak leaves, has received word that King Albert has conferred the Order of the Crown, with the rank of chevalier, for his daring and skill as flight commander of the Eighty-eighth Aero Squadron. He took part in many daring raids in bombing planes along the Verdun front in October. Lieutenant Bernheimer is twenty-four years old. He returned from France several weeks ago.

Automobile Club of America Presents Rickenbacker with Gold Medal

New York, N. Y.—Captain Edward V. Rickenbacker, the Ace of Aces, was presented a gold medal at a dinner held in his honor at the Automobile Club of America on April 5. Addresses were made by Colonel Jefferson De Mont Thompson, of the Police Department; Captain Granville A. Pollock, head of the Police Aero Squadron, and Captain Mapes. Colonel Thompson announced that Captain Rickenbacker had not only accepted the lieutenant-colonelcy in the police air service, but had contributed two aeroplanes.

Bolling Field Notes

Capt. Miller V. Bishop of the Senate Committee on Military Affairs, recently returned from France, has been appointed adjutant at Bolling Field. Capt. Bishop went to France in command of the 341st Aero Squadron.

Lieut. George Perkins, army aviator at Bolling Field, who received the Croix de Guerre with a palm for distinguished service overseas, has received his discharge. Lieut. C. A. Smith, who had been stationed at Bolling Field, also received his discharge from the service last week.

Lt. Col. Wm. C. Sherman, Corps of Eng., who is a flier and has been connected with the Air Service for some years, has been detailed as Chief of Air Service Training, which will include heavier-than-air training at the ground schools and flying fields under General Mitchell.

The Medical Division is now a branch of the Administrative Group.



The aviator's view of March Field, Riverside, Cal., showing the twelve hangars

FOREIGN NEWS

Aeroplane Averts General Strike

By making a hurried flight to Paris to consult Lloyd George, Mr. J. H. Thomas was able to avert a general strike of the railways throughout England.

Royal Naval Military and Air Force Tournament in June and July

The Royal Naval, Military and Air Force Tournament will be held at Olympia from June 26 to July 12, inclusive.

Still Larger Dirigibles for England Ordered

It is stated that the Admiralty has just placed orders for four new rigid airships with Messrs. Beardmore & Co., Messrs Armstrong, Whitworth & Co., and Messrs Short of Bedford. The last-named firm will build two of these aircraft, which are to be bigger than the R-33 and R-34, which have recently made trial flights.

The cost of the vessels will be about a million sterling, and they are expected to surpass any rigid craft yet built in England. They will be 700 feet in length, have a capacity of 2,500,000 cubic feet, and a lifting power of about 70 tons. They will have a speed of 80 miles an hour.

Berlin Leipzig Airship Line Operating

According to a message from Berlin, a German airship company has started a twice-daily service between Leipzig and Berlin for passengers and mails.

From the same source comes a report that the inaugural flight on the new air route between Berlin and Warnemunde, whence there is a ferry to Copenhagen, has been carried out. The time taken for the flight, in spite of the squally weather, was one hour and twenty minutes.

Australian Government Offers $50,000 Prize for First England-to-Australia Flight

The Australian Government has voted a prize of $50,000 for the first flight of aeroplane or airship from England to Australia.

Five Italian Deputies Fly 120 Miles to Session

The Rome-Naples aeroplane service continues successfully. Five deputies left Rome for Naples on board a Caproni machine.

$20,000 in Prizes for French Aerial Touring Contest in June and July

In *L'Avenir*, M. Frantz-Reichel announces that a Tour de France is being organized to take place in June and July next. It is proposed that the competition shall be limited to large touring machines, and prizes amounting to 100,000 francs will be awarded. The start and finish are to be in the neighborhood of Paris.

Lieut. Roget Flies from Lyons to Rome in Seven Hours

Lieutenant Roget, a French aviator, arrived here at 4 o'clock on April 6th after a non-stop flight of 1,100 kilometres (684 miles) from Lyons, France. He left Lyons at 9:15 o'clock in the morning.

Chilean Aviator Flies Over Andes at Height of 19,600 Feet

Santiago, Chile.—Lieutenant Cortines, in a British aeroplane, flew over the Andes on April 5 at a height of 6,000 metres (19,600 feet).

King Albert Flies from Paris to Brussels

Paris.—King Albert, who has been in conference with the peace delegates here, left for Brussels by aeroplane on April 5. His trip from Brussels to Paris had also been made by aeroplane some days previous.

Offers $20,000 Prize for South Pole Flight

Milan.—While plans are being laid for a dash to the North Pole by aeroplane, interest here centers in a proposed flight to the South Pole. To encourage aviators to attempt the flight Count Adama Ostaszewski has offered a prize of $20,000 for the aviator making the flight to the South Pole.

Aerial Passenger Service for Tourists in Switzerland

An aerial passenger service between Zurich and St. Moritz, in Switzerland, is planned, a company being formed with capital stock of $96,500. The Swiss legislature announces itself in favor of the scheme. A flight between the two cities can be made in an hour and the fare will be $96.50 per person. These two towns are well known resorts frequented by tourists, and it is expected that they will patronize the air route.

Aeroplane Engine Competition in France Will Help Industry

Paris.—A big aeroplane and aeroplane engine competition will be organized by the French Government next year. It has been decided that there will be three types of engines: (a) 125 to 150 H.P.; (b) 250 to 300 H.P.; (c) 500 to 600 H.P.

Each engine will have to run 300 consecutive hours at 80 per cent. of its maximum power.

The maximum weight for the complete engine with water, gasoline and oil for five hours' running is 6.6 lbs. Propeller speed is limited to 800 R.P.M. It has been decided that in order to allow present engines to compete, they can be used with geared-down propellers, in order to obtain the limited number of 800 R.P.M.

The aeroplane conditions are: (a) Solidity with a coefficient of 6. (b) Excess power; theoretical ceiling 5,000 ft. (c) Minimum speed at 3,280 ft.; 93 M.P.H. (d) Landing ability; practical conditions corresponding to a weight of 38 kgs. per square metre maximum (this is based on the fact that the lower the wind for a given area, the easier it is for the plane to land). (e) Security; Multi-engines. When three or four used, a single engine should be capable of maintaining the machine in the air.

A Conservatoire of Aviation

The proposal for a Conservatoire of Aviation emanates from the French State Aeronautical Department. It is only waiting the official approbation from the competent authorities. It is proposed to erect the Conservatoire near an aerodrome, which is described as the cradle of French Aviation—very likely at Issy. The main hall is to shelter the remains of all historic machines.

French School of Aerial Navigation

The school for Aerial Navigation will be the creation of the French Aeronautical League, and was unanimously decided upon as a result of Captain Colis' recent address describing how he and Roget flew the Mediterranean under adverse climatic conditions. The school will be open to all civilian pilots, and courses will be commenced immediately.

Tarrant Super-Triplane Will Carry 100 Passengers

London. (Cable to *N. Y. Times*).—The *Daily News* gives further particulars of the Tarrant super-triplane which Major Gen. Seely referred to in the House of Commons on March 13 and which is being assembled at the royal aircraft factory at Farnborough.

A striking feature is its long cigar shaped fuselage, similar in appearance to the body of the Zeppelin machine. It was originally designed to bomb Berlin, carrying 10,000 pounds of bombs and, a crew of eight over a distance of 1,200 miles. It has a span of 141 feet, the fuselage is 85 feet and is fitted with six Napier Lion 506 engines.

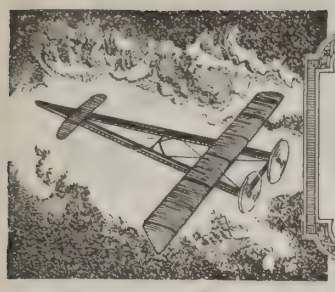
When the aircraft industry began preparations for commercial flying the makers of the super-triplane followed suit, with the result that this type will be capable of carrying over 100 passengers, or cargo weighing nine tons, for a distance of 1,200 miles. The speed for the converted machine will be anything from 80 to 100 miles per hour. It possesses enormous possibilities in continuous flying, and by extra tankage it would be possible to make a nonstop flight lasting twenty-four hours.

The fuselage is built of wood and strengthened by a patent system of girders not unlike the masts of an American warship, and this obviates the use of tracing wires and other fittings common to the ordinary aeroplane. There is freeway right down the center of the fuselage permitting anyone to walk to the tail. Three rows of glass windows, giving the appearance of portholes, will be fitted inside of the triplane, and tiers of seats will be provided for passengers.

In addition to the staff of pilots there will be on board two or three engineers and mechanics, a navigator, and a wireless operator.

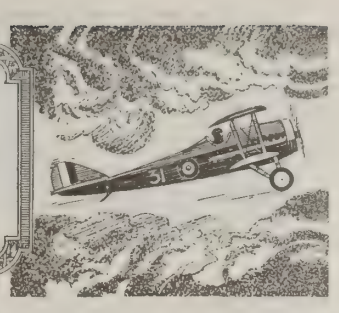


The new Grahame-White "Bantam," with its span of 20 feet, next to a 30 passenger biplane having a span of 89 feet



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



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Three Cylinder Motorcycle Engine

THE Three Cylinder Motorcycle Engine that was recently mentioned in connection with a small biplane which I described on this page is shown in the accompanying drawing.

The reader will note that I have used Harley Davidson cylinders, but a good aeronautical engine can be made up from almost any motorcycle cylinders.

Most motorcycle engines have what is known as left and right cylinders. I have used one kind only in this case, the right hand cylinder.

The exhaust pipe is short and bent back to allow free exhaust, and when the machine is traveling forward the air helps to suck the burnt gas out of the pipes.

The intake manifolds are long, and I would advise making them of aluminum tubing, connecting them to the exhaust parts at one end by the special unions used for motorcycle work, and having all three meeting at some point about the crankshaft center line, where they are attached to the carburetor.

A three-cylinder magneto of a good make should be used. The order of firing is one, three, two, etc., starting with the vertical cylinder.

The crankshaft can be the same as is used in the ordinary motorcycle, but the crank pin will have to be longer to allow placing another connecting rod in place. This could be accomplished by making two of the rods thin and placing them inside of the forked rod, which could be made wider at the bottom to allow placing the other rods inside of it.

To accomplish all of this, the crankcase might have to be made a trifle wider than would be necessary. The above engine if made right would develop easily 27 or 30 H.P. at 2000 R.P.M.

The propeller to use with this engine would be 5½ feet diameter by 3½ feet pitch.

This engine is described simply to give more advanced aeronautic enthusiasts an idea of what can be done with a little work, but for those who cannot build a motor of this kind I would refer to any of the small, air-cooled motor which are advertised in the columns of AERIAL AGE.

Model Aeroplane Contests

It has been decided to start the first contest for hand-launched models for distance on June 1st. This is to allow the young men in the service time to get back to civilian life and to get their models ready for competition.

The Illinois Model Aero Club have been the best long-distance model aeroplane builders for the past few years, but from the latest reports the San Francisco Model Aero Club and a few Eastern Clubs will be in the running when the final results are posted in AERIAL AGE.

In the next issue I will give a list of events, and the prizes attached to each. The Villard Cup will be offered again for the champion long distance club contest. The Illinois Model Aero Club must win it, but once more to have permanent possession, as thy have won it twice since it was offered by Mr. Villard of the Aero Club of America.

Most of the models will be driven by twisted rubber bands. These bands are sold by model aeroplane supply houses, and are made up especially for this purpose. Wood, bamboo, bearings, and propellers, as well as small fittings for this particular work are also carried by these people.

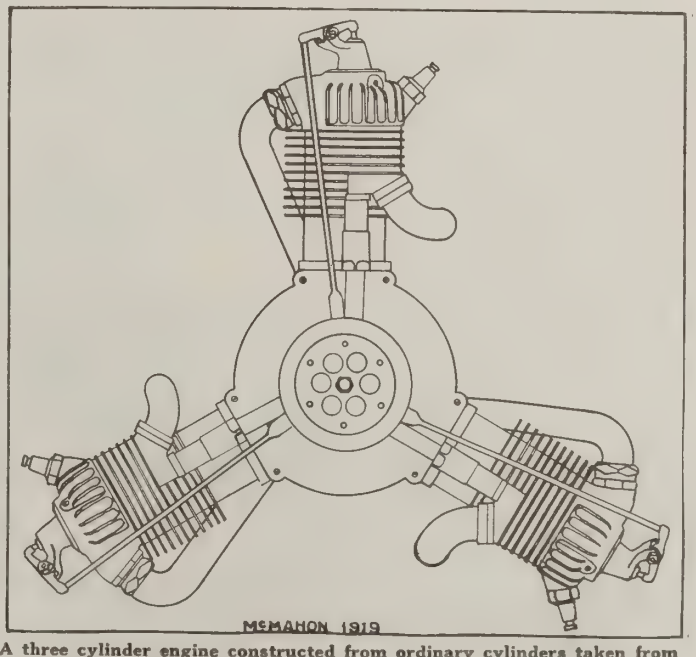
The simple "A" frame twin propeller model is generally used for long distance racing, and well designed models have been known to travel distances up to one mile in a single flight.

The reader need not think that long distance model flying is confined to schoolboys only; many men are enthusiastic fliers of these light models, and it is an interesting sight to see men young and old winding their rubber motors up in preparation for a model flight at one of the big meets.

In the next issue of this paper I will give a drawing of a successful long distance flying model.

What is the Best Power for Model Aeroplanes?

Many inquiries come to me from readers as to the best power to use in model aeroplanes. Up to the present time nothing has been found to act better than twisted rubber strands and as they are the simplest and most efficient I would advise the less experienced reader to use rubber in preference to all other forms of power plants. It is a known fact that twisted rubber strands, give more power per pound than any other form of power. Then again, the cost is another reason why rubber is better than steam or compressed air motors, for simple models. I would not put rubber before the other kind of plants for scale or more advanced models.



A three cylinder engine constructed from ordinary cylinders taken from a Harley-Davidson Engine, and a special three cylinder crankcase. See above description



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

"IF I HAD KNOWN"

(To Her Ace)

If I had known or had I guessed at springtime—
That day which now to me seems but a dream,
A rosy dream when down the path we rambled
Just you and I 'longside the silver stream.
That day when all the wood glowed bright and teemful,
Full lovely then the flowers, clear the sky,
The wild birds on the hill their love lays chanted—
Apart from all the world—just you and I.

If I had known what now I know since parting,
That yon white cloud-ships slowly moving by
Would bear you on their bosom through the ether
Away from me—to pilot God's blue sky—
I would have then, ah then, clasped hands, the tighter,
And made the farewells longer, Lover Mine:
But, oh! the rapture and the joy now knowing
That soon anew we worship at our shrine!

FLORENCE TUCKER OSMUN.

Extract from new air novel (pilot heroes are of course all the rage with the young lady authors): "To his horror Hubert found that the engine of his seaplane was at fault. He decided to taxi, but to add to his trouble the land was afar off and not a single taxi-cab in sight."

Aviation Tactics Win

"Fighting aeroplanes and the common house fly practice the same arts of self-preservation," said the aviation lieutenant. "Mark the little fly which arrives on your nose.

"Heavily your hand cleaves the air to swat the difficult fly. Instantly the fly departs, easily coming back with impunity as it wishes. Chase it off your nose—lo, it circles, dodges, spirals and dives to your chin. Off your chin to your wrist. Off your wrist to your cheek—never further from its objective than an inch or two.

"All created things have their limited zones and habitats. Not so the common house fly. Every climate and corner of the earth is its home. Thus we know the aeroplane has a numerous future, because the house fly is an ace."

Aeronautics in Biblical Times

"Ever read your Bible, Bill?"

"Yes, sometimes. Why?"

"Do you think the prodigal son came home in a 'plane like some of them you and I know?"

"Out with it. I'll buy it. What's the answer?"

"Well, the Bible says that when his father came out to welcome him, he fell on his neck."—*Aircraft.*

Demobilized

You can take away his chevrons
And his uniform so neat;
You can put him into civvies,
Thrust him out into the street;
You can grind him 'twixt the millstones
Of your modern business schemes,
But his soul—you'll never crush it,
And you'll ne'er destroy his dreams.

He has seen the radiant glory
In the Eastern morning sky,
He has paced the aerial pathways
Through the fleecy clouds on high;
He has braved the lightning flashes,
Faced the tempest and the rain
And he'll fight his mighty battles
Daily o'er and o'er again.

He has known the joys of battle,
And has conquered 'mid the strife.
Yea! The things that he accomplished
Shall endure throughout his life.
You can send him from the Air Force,
You can scheme and you can plan.
Try to make a business asset—
He'll remain a flying man.

—*B. G. A. in Aircraft.*

"Gee, I wish I had my time to start over again," said old man Columbus. I'd fly the Atlantic with the same crew, and not a single dago would want to mutiny so long as I'd my hands on the joy-stick."—*Aircraft.*

PERCY AND FERDIE---Their Transatlantic Trip Has Been Indefinitely Postponed - - By H. A. MacGILL

Creator of the Hall-Room Boys.



—From the N. Y. Evening Sun.

and Washington cabled Paris -- ---- "AC"

AT Cleveland, Ohio, in official test before an Allied commission, the first Liberty motor ran fifty hours without a change of spark plugs.

That motor was AC-equipped.

Not one of the French, English or Italian engineers who witnessed this performance had before seen a high-powered airplane engine operate fifty hours with a single set of spark plugs.

Eighty to ninety of the best European spark plugs were commonly required for a fifty hour test.

When the United States began her gigantic aircraft program, Washington cabled Paris for advice on spark plugs. Paris answered: "It requires eighty to ninety of the best airplane plugs we can produce to run an aviation engine fifty hours. What have you?"

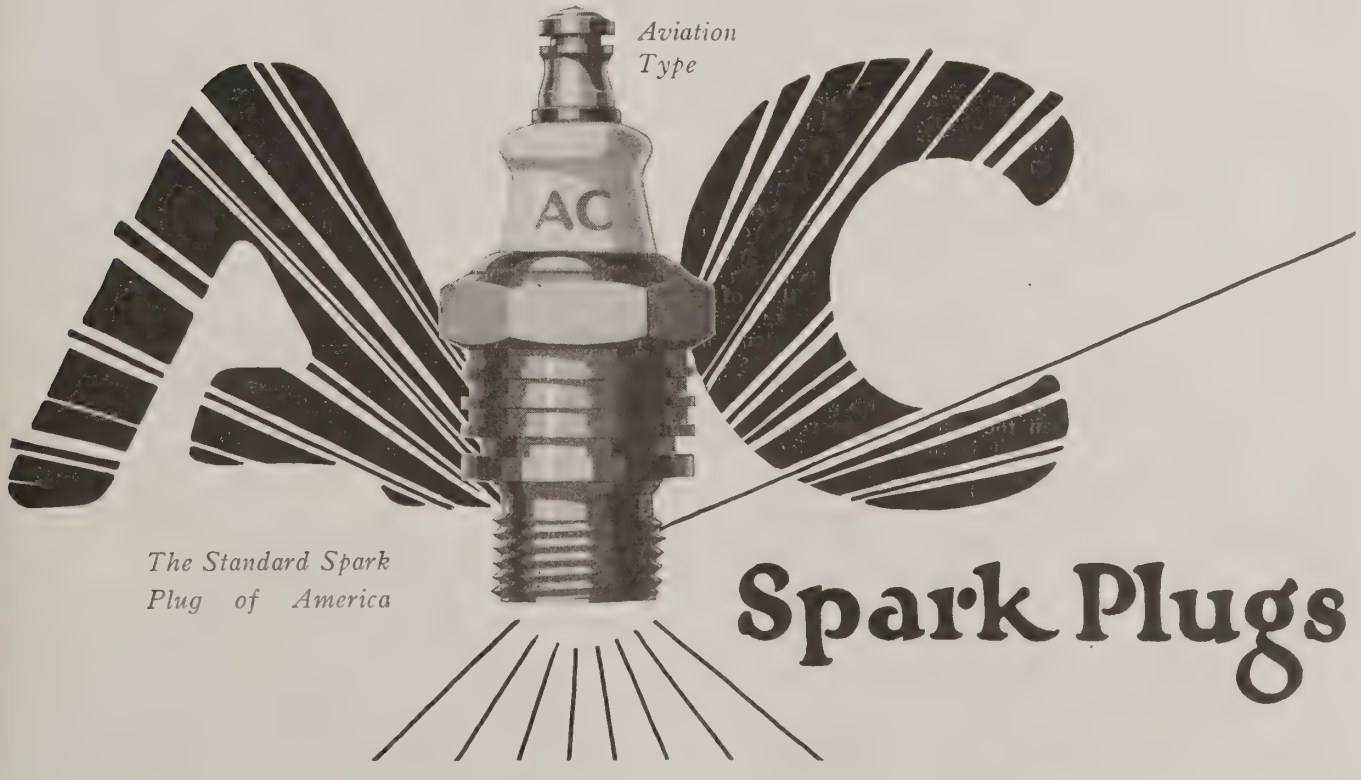
Then came the battleplane test, mentioned above, where all spark plugs were given the opportunity to qualify, and Washington cabled Paris "The best is AC."

So it was that AC Spark Plugs were selected for standard equipment on all Liberty and Hispano-Suiza airplane motors.

During the war, aircraft plugs for the government had first call in our factories. We are now ready to supply AC Aviation Plugs for private use.

Champion Ignition Company, FLINT, *Michigan*

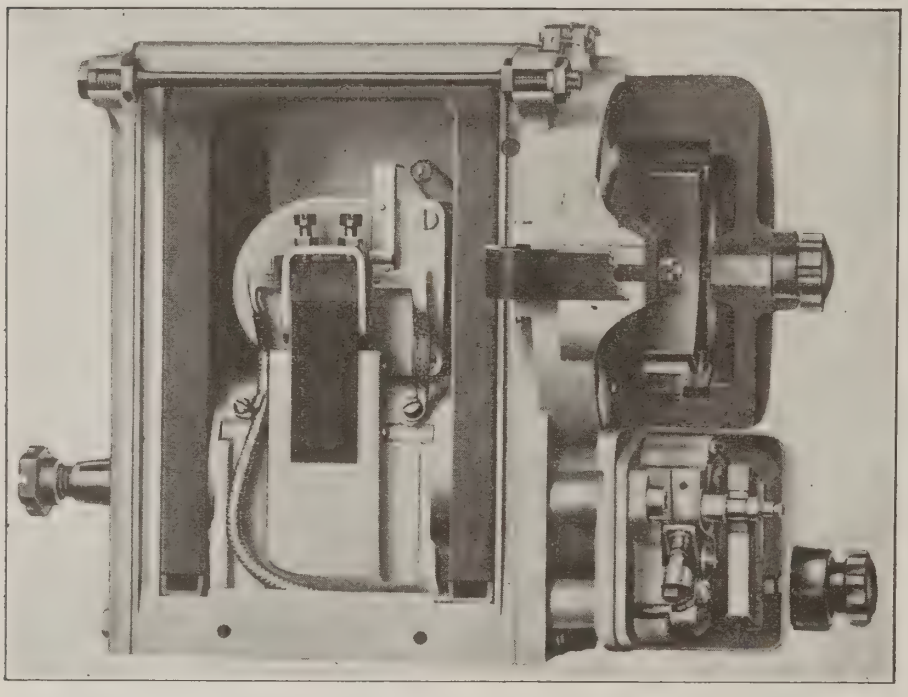
U. S. Pat. No. 1, 135, 727, April 13, 1915. U. S. Pat. No. 1, 216, 139, February 13, 1917. Other Patents Pending



The New Splitdorf Magneto

IN the production of its new series of Aero type magnetos for passenger cars and motor trucks, the Splitdorf Electrical Co. has incorporated certain changes that will interest alike the engineering fraternity and laymen connected with the automotive industry. The new instrument makes its appearance in a jacket of khaki, as is appropriate for one born during the stress of war and a most effective participant in the conflict on the allied side.

Aside from this change of color there are a number of interesting constructional innovations. One of these is the use of a single square carbon brush. The new instrument shows a decided increase in sturdiness, the interrupter points, for instance, being noticeably heavier. Micarta gears are used and the distributor board



The Splitdorf Aero Magneto with cover removed

is made of a new composition known as Americanite. The Mason principle of stationary windings and revolving poles is retained in the new instrument, which is unidirectional.

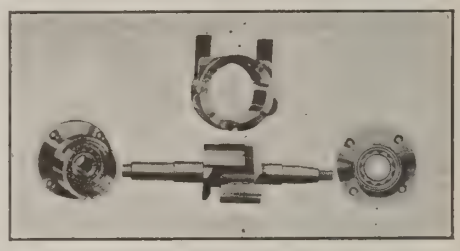
While no radical change has been made, still the importance of the unidirectional feature will at once be realized and appreciated by everyone interested in this class of equipment.

Since a magneto is an alternating current generator, it produces its current in the form of positive and negative waves. It has been found in experimenting with instruments of this kind that one can wave series always is stronger than the other and in the Aero type magneto it is the negative wave series which is the stronger. The aero instrument is so designed that the negative waves are utilized as the spark producing waves. These flow always in the one direction through the instrument and the spark plugs, hence the designation unidirectional waves as the spark producing ones. In the Aero magneto the breaker operating cam has two lobes and the revolving field or rotor has four wings.

When the rotor wings on the distributer end of the magneto leave the poles, the cam separates the platinum points. A spark is now produced. When the rotor wings on the drive end of the magneto leave the poles, the cam holds the platinum points open; no spark is produced at this function, but the stray magnetic lines and eddy currents in the field poles and coil are scavenged, leaving the core and poles free from magnetic interference for the next spark producing reversal. The above is for a magneto of right hand direction. In the left type the cam opens the platinum points when the rotor wings on the drive end leave the poles. In this case the position of the magnets is reversed. This is done to maintain a spark of the same polarity in both bases.

Americanite is a new insulating material which the Splitdorf company has discovered for use in electrical instruments and which the company manufactures in its own plant. It is moulded similar to products of this nature and in the case of the distributor block the contacts are moulded in with the Americanite. Mircata is the pressed material which is now used for the gears in Aero magnetos. The Mircata not only is very quiet, but is long lived as compared with metal.

The principle employed in Aero magnetos is that of using a so-called rotor (which is supported by the magnet) constituting extensions of the magnet poles. This rotor has two wings insulated from each other and each in continual contact with one of the poles, so that the polarity of the revolving members never changes. These wings revolve with the shaft, naturally, and as they do so they brush field pieces which are in contact with the core of the winding the latter houses in the arch of the magnet. Thus, the revolving pole extensions cut the lines of force and produce a low tension current in the primary. The production of the secondary is the same as that of the usual design of magneto. It may be seen that the one big disadvantage of the revolving armature type is overcome. This disadvantage is best illustrated by mentioning that in the armature type the tendency of the armature core is to maintain its polarity, thus having a reluctance to reverse which produces a deficiency in current generation. The revolving pole instrument has fewer parts than the ordinary type magnets; there is no change of polarity of the revolving members and the spark strength is the same regardless of timing lever position. Other advantages claimed for the Aero magneto are the simplicity of



Details of Splitdorf Aero Magneto contact breaker

construction, its provision for protection of the windings and condenser in the arch of the magnet, its very quick break and the great ease of adjustment even though the instrument be in operation.

Work of Marine Aeronautic Corps

Washington, D. C.—The Navy Department authorizes the following:

The first aviation unit organized in America and sent abroad using American-made material was the First Marine Aeronautic Company, equipped for water flying only, which is now stationed abroad at a naval base. This information is given in an announcement of the progress of Marine Corps aviation which has just been made public at Marine Corps headquarters.

In addition to the flying field maintained at Miami, Fla., where all training in actual flying is given, the Aviation Section of the Marine Corps gives candidates instruction in ground work at the Massachusetts Institute of Technology, Boston, Mass., and has two schools for instruction in aviation mechanics.

The standard of the Marine Reserve Flying Corps is very high. No men are accepted for entrance into its ground school with the prospect of becoming officers unless they are as nearly physically perfect as possible. Applicants must weigh not less than 135 pounds and not over 165 pounds. The enlisted personnel has been selected from the very best in the Marine Corps. They are highly trained and given every opportunity for promotion to a commission.

(*Continued from page* 288)

Minimum H.P. required for horizontal flight 8
Rate of climb, first minute, 1020 ft. per min.

Useful load 185 *pounds*

Pilot 150
One hour's fuel.....35

(*Performance*)

Speed range, M.P.H. 102-32
Minimum H.P. required for horizontal flight 7
Rate of climb, first minute, 1,180 ft. per min.
Climb in 10 minutes.....9,000 ft.
Climb in 12 minutes.....10,000 ft.
Climb in 25 minutes.....15,000 ft.

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OXYGEN AND THE TRANS-ATLANTIC FLIGHT

By MAJOR T. S. RIPPON, R.A.F. Medical Service

ONE of the most important articles that should be carried on the machines attempting the flight across the Atlantic is an oxygen outfit for the pilot. It may be suggested that the extra weight is a handicap, but a consideration of the following facts should satisfy anyone of its value. (1) Oxygen increases the staying power and decreases the symptoms of

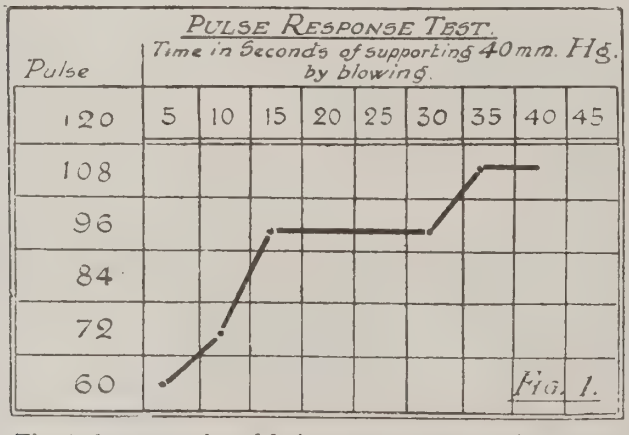


Fig. 1 shows results of fatigue test by supporting 40 mm. Hg. by blowing. Before test.

fatigue when given to athletes. I have seen it given during boxing contests with excellent results. It was administered to a cross-Channel swimmer when he was exhausted, and he was stimulated to renewed vitality and strength. (2) I have examined pilots after altitude flights with and without oxygen, and I can vouch for the fact that those pilots who did not use oxygen were profoundly fatigued, whilst those who used it were practically normal when they landed. The following figures demonstrate the accuracy of this statement. They show the physical condition of two officers before and after a flight using a liquid oxygen apparatus.

The test was absolutely successful in demonstrating that by the use of oxygen the pilot can be maintained at altitudes in a normal physical condition instead of being mentally sluggish and physically fatigued.

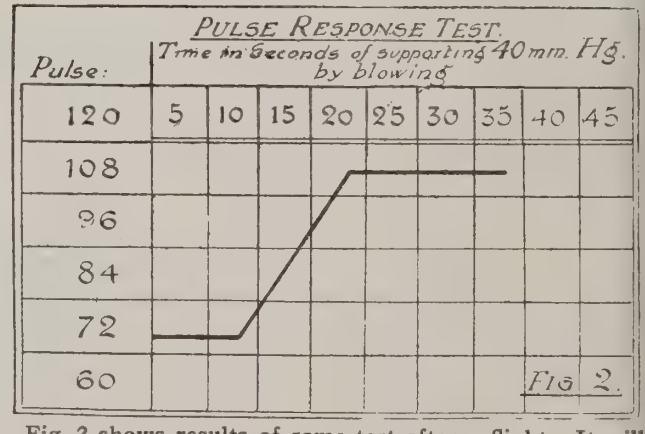


Fig. 2 shows results of same test after a flight. It will be seen that there is little or no difference.

1. The examination of Major S. for respiratory fatigue with the mercury manometer was as follows: Before flight the expiratory force was 60 mm. Hg. After flight it was 65 mm. Hg. The pilot felt invigorated instead of tired.

2. The breath holding test gave 46 minutes before flight, 55 minutes after flight.

3. Fatigue test by supporting 40 mm. Hg. by blowing. (See chart.)

Fig. 1.—Before flight.....40 secs.

(*Continued on page* 308)



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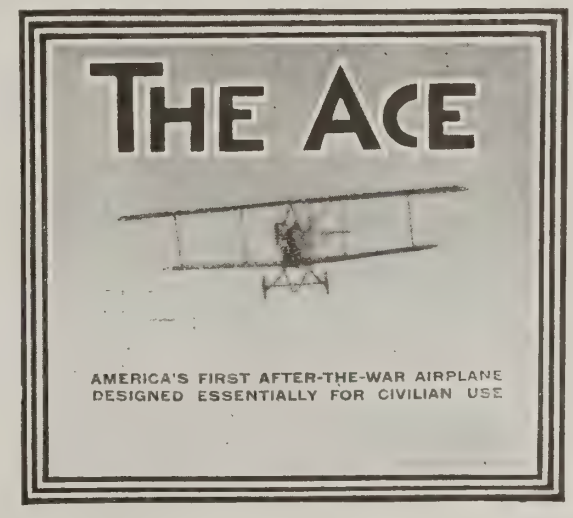
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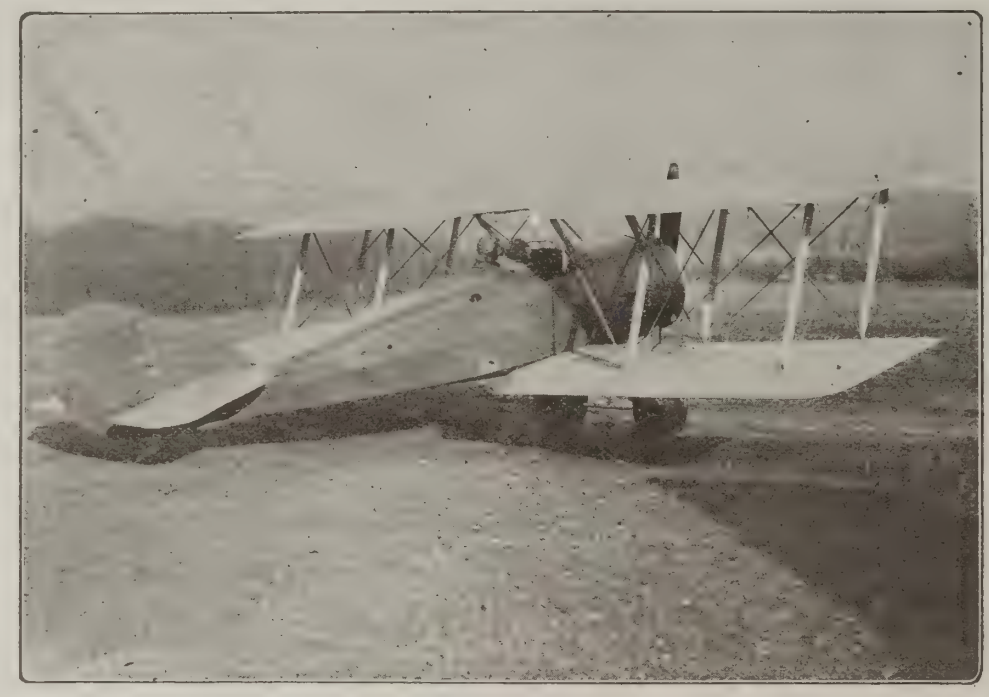


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Equipped with 80 h. p. Le Rhone Engine.

High speed, 90 M. P. H.

Landing speed, 35 M. P. H.

Climb 6,700 ft. in first ten minutes.

THOMAS-MORSE AIRCRAFT CORPORATION

ITHACA, N.Y. U.S.A.

(*Continued from page* 306)

Fig. 2.—After flight.....35 secs.
Showing practically no difference.

1. *Pulse*—

Circulatory System

Before flight.....70
At 5,000 ft.....75
At 10,000 ft.....82
At 15,000 ft.....70

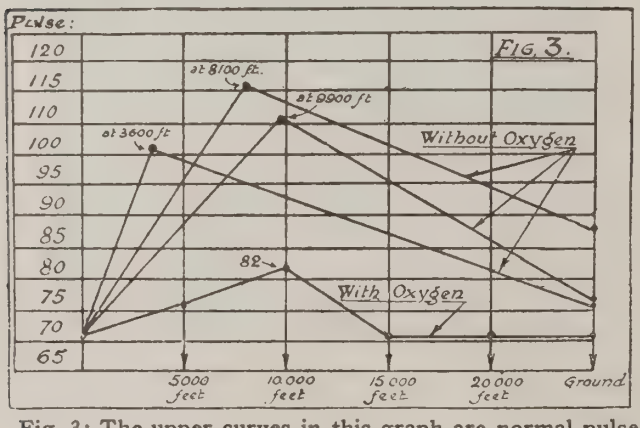


Fig. 3: The upper curves in this graph are normal pulse curves during a flight without oxygen, while the lower curve shows Major S.'s pulse during a flight in which he used oxygen. It will be noticed that the increase is very small for the first 10,000 ft., after which it drops to normal again.

At 20,000 ft.....70
After flight.....70
Showing that at 20,000 ft. his condition was normal.

2. *Blood-pressure*—

	Before flight	Afterflight
Systolic	120 mm. Hg.	125 mm. Hg.
Diastolic	80 mm. Hg.	90 mm. Hg.
Pulse pressure	40 mm. Hg.	35 mm. Hg.

Condition improved rather than depressed.

Symptoms.—No symptoms of distress. Slight discomfort at 15,000 ft. owing to expansion of gas in intestines due to lowering of atmospheric pressure.

Examination for decreased efficiency by estimating the visual reaction time by means of the pendulum myograph.

Major B.—Before flight—Visual reaction time, .221 secs. After flight.—.220, showing no appreciable loss of reflex speed.

In 1917 I examined a number of test pilots at Hendon after altitude flights with oxygen, and in every case there was marked fatigue.

Amongst others, I examined the late Capt. B. C. Hucks, and the actual figures were as follows:

	Before Flight	After Flight	Remarks
Pulse	84	96	
Breath held	65	48	Fatigue
Sustained 40 mm. mercury by blowing	54	35	Fatigue

The Atlantic flight is a test for the endurance of the pilots as well as the engines, and the value of oxygen at even low altitudes on long flights, is of the greatest importance.

—Courtesy Flight.

Dr. Bell Developed "Flying Fish" to Prey on Submarines

Washington.—Dr. Alexander Graham Bell, inventor of the telephone microphone and member of the Advisory War Board of the Navy Department, disclosed the invention of a device which threatened to make still more precarious the existence of submarines. The device is a mechanical flying fish, experiments and tests having been carried out at Braddeck, Nova Scotia.

The principle of the contrivance is that of the aeroplane. It has two aeroplane engines and propellers, but the wings are small, and are submerged. They were placed like the rungs of a ladder, one ladder being beneath the bow and one under each engine. They were tilted at an angle and made of hardened metal to resist wear.

The water pressing on both sides of the tilted planes caused the boat to rise when a speed of fifteen miles an hour had been attained, but the downward pressure of the water prevented it from rising clear of the water.

UNIVERSITY OF
OCT 20 1919

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An unusual view of the battlefleet riding in the Hudson River as seen from the air. © International Film Service.

Opening of Atlantic City Convention to be Victory Loan Rally

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The searching strain of war showed the necessity for Magneto Ignition, and the qualities of Magneto Ignition reach their highest development in Bosch Magneto Ignition.

A Bosch Magneto on the airplane you make or fly means a self-contained source of riproaring Bosch Sparks which get all the power from all the mixture.

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OPENING OF ATLANTIC CITY CONVENTION TO BE GREAT VICTORY LOAN RALLY

New York Herald Adds $3000 to Long List of Trophies and Prizes for Competition and Atlanta Journal Adds $1750

THE opening of the Second Pan-American Aeronautic Convention and Exposition is to be a Great Liberty Loan Rally.

Two more important prizes have been added to the long list. The New York *Herald* has offered a series of prizes amounting to $3000 for the best records made with aeroplanes of different horse power, from 100 h.p. to 1500 h.p. The Atlanta *Journal* has added prizes totalling $1750 to be awarded to the three aviators who make the best records in flying from Atlanta to New York carrying copies of the Atlanta *Journal*.

$1,000 Additional Cash Prizes for Intercollegiate Races

$1000 additional cash prizes have been offered for the Intercollegiate races, the prizes to go to defray the expenses of the Collegiate clubs competing.

The second Pan-American Aeronautical Convention, to be held at Atlantic City throughout the month of May, gives every promise of developing into the ace of aviation meets in the world's history. Featured by many notable contests that will try the war-won skill of scores of young men who winged the Hun under all sorts of battle conditions, the big objective of the meet will be to demonstrate the peace possibilities of the aircraft under war's pressure.

Great interest will be attached to the five Saturdays included in the month's programme when the spectacular stunts of competition, in which many aces of the Allied nations are entered, will be staged, while every day activities of the convention will be interesting because of the tests of all types of winged ships and the lectures by aviators and other aviation experts at the convention headquarters on the Steel Pier.

Aviation Field Ready

Preparations for the meet are now nearing completion. The big Municipal Aviation Field on the west side of the resort has been graded down and full facilities installed for aircraft about the field, which measures almost a mile square. Clubhouse features are ready just across the Meadow Boulevard opposite the field for the fliers, while just beyond along one of the protected reaches of the inside waters parking spaces for seaplanes have been arranged so that the birdmen who arrive here next week to tune up their ships and acquaint themselves with the atmospheric conditions of this section of the coast will have everything they need for their trial spins.

Included among the Saturday features will be seaplane contests over measured courses for both straightaway and altitude work, and the special intercollegiate race, in which Harvard, Yale, Columbia, Pennsylvania and several other of the leading universities will be represented. Land aeroplane contests, dirigible races, kite balloon speed events in ascending, descending and manœuvring, parachute competition and a novelty event for the "aviettes"—bicycles and motorcycles equipped with wings—are on the programme for the week ends, while on the daily list are exhibits of aeroplanes, motors, accessories, demonstrations and tests of sea and land planes, motors, dirigibles, balloons, passenger and lifting tests, showing the commercial possibilities of the lighter and heavier-than-air machines.

Interest in Pulitzer Trophy

It is expected that not less than a million people will witness the contest for the Pulitzer Trophy, offered by *The World* and the St. Louis *Post-Dispatch*. The keen interest which has been displayed in this long-distance event, and the number of expressions of intentions to enter, give assurance of spirited rivalry, making it almost certain that the month will see all American records broken.

Sixteen prize contests have already been arranged by the management of the convention. The promise is given that there will be a large number of others, many of first-class importance.

The Pulitzer Trophy, valued at $5,000, will go to the aviator making the longest flight to or from Atlantic City. Following th offer by *The World* and the *Post-Dispatch*, the *Boston Globe*, Cleveland *Plain Dealer* and Detroit *News* also offered trophies, with first, second and third cash prizes of $1,000, $500 and $250 respectively for the best flights between the city in which those newspapers are published and Atlantic City. The Atlanta *Journal* also has offered cash prizes of $1,000, $500 and $250 for the best flights in one day from Atlanta to Atlantic City, the contestants to carry and deliver copies of the *Journal* of current date.

Money awards so far total over $50,000, and it is expected that this amount will be doubled before the meet officially opens. Every effort is being made to have some flyer start or finish a transatlantic flight on Atlantic City's beach, the Aero Club of Atlantic City offering $25,000 to the successful aviator.

ARMY AVIATOR MAKES FIRST CHICAGO-NEW YORK NON-STOP FLIGHT

THE first non-stop aeroplane flight from Chicago to New York was made April 19 by Captain E. F. White, an American Army aviator, who flew 727 miles in a De Haviland Four army reconnaissance plane at an average speed of about 106 miles an hour. He ascended from the Ashburn Aviation Field, Chicago, at 9:50 o'clock, central time, and descended at Hazelhurst Field at Mineola, L. I., at 5:40 o'clock in the afternoon, the actual flying time being 6 hours and 50 minutes.

Officials of the Aero Club of America said they believed

that Captain White would have not only the honor of making the first non-stop flight between Chicago and New York City, but that he might also have the honor, for a while at least, of holding the American, and perhaps the world's record, for continuous flight.

In beginning the flight that Victor Carlstrom, Ruth Law, Katherine Stinson and many other aviators have attempted with only a short margin of distance cutting them from success, Captain White had great difficulty in taking to the air on the soft ground of Ashburn Field, the take-off grounds approved by the Aero Club of Illinois. The ground there was soft and the heavy army plane, with her load of more than 190 gallons of gasoline, cut into it deeply, but after the aviator had had his plane dragged to a drier and harder spot in the field he managed to take to the air.

Circling over Chicago, Captain White ascended to a height of more than 10,000 feet and throughout his flight he did not go below this level until he was ready to land, and at intervals he flew as high as 12,000 feet. He followed the route of the New York Central Railroad for the greater part of the distance, and cities along the route reported seeing him flying at great height and at high speed.

Colonel Archibald Miller, Director of Aviation in the Department of the East and one of the commanders of the Hazelhurst Field, was waiting there to meet Captain White and his mechanician, H. M. Schaffer, and they were taken to the field headquarters, where an informal reception was held.

The biplane used by Captain White in his flight was one of the standard De Haviland Four machines constructed for the use of the army in France, equipped with a twelve-cylinder Liberty motor of about 400 horsepower.

The machine was prepared for the trip at McCook Field, near Dayton, Ohio, and tested thoroughly in several flights. As one of the last tests, Captain White flew the machine from Dayton to Detroit. On Friday he flew it from Detroit to Chicago, and the motors and plane behaved so well on that test flight that Captain White decided to try to fly to New York without delay.

In making his landing at Ashburn Field upon his arrival there from Detroit the aviator had difficulty in landing because of the muddy condition of the field.

Get News of the Start

Shortly after 10 o'clock in the morning Henry Woodhouse of the Board of Governors of the Aero Club of America, received a telegram from James S. Stephens, President of the Aero Club of Illinois, saying that the Board of Governors of that organization had received notice from Captain White that the record flight would be attempted. The telegram added that the start had been made at 9:40 o'clock, central time, and asked that a representative of the Aero Club of America, with the army officers of the Eastern Department and of the army aviation fields at Mineola, set the actual time of the arrival of the plane in this city.

Hours before the plane was due to arrive at Mineola a group of officers had gathered at the landing place to wait the ending of the flight. Telegrams were received from towns in Indiana, from Cleveland, Ohio, and other places in this State advising them that Captain White was still in the air. Officials of the Aero Club were on the watch in this city and they caught sight of the dark blue machine about 5:30 o'clock as she circled high overhead on her way to the landing place.

Captain White would not discuss the details of the flight when he landed, and the army officers did not press him to talk because of the manifestation of weariness both by him and his mechanic. He said that the winds and all other atmospheric conditions had been perfect throughout the flight and that this, with the perfect functioning of the motor and the good behavior of the plane, enabled him to make the continuous flight. He said that he felt no more tired than he would have felt had he ridden three hours in an automobile, but it was plain to the officers that the long nervous strain had had its effect upon him and his mechanic.

Give Aviation Its Chance

THE news that the military aviation program of the War Department is to be sharply curtailed at once should not greatly startle any one who is in touch with the general scheme of our demobilization plan. An army of a little more than 500,000 men, such as is proposed for the United States obviously does not need the aviation equipment of an army of 4,000,000. Whether the demotion of Major-General William L. Kenly, director of military aeronautics, to a position as colonel of artillery is or is not inspired by official hostility to his plan for a permanent aviation organization distinct from the army, navy and marine corps is beside the question. We were certain to hear before long of a reduction in the size of the service.

Much more seriously to be regretted is the apparent governmental inclination to turn its back on all aviation, military or commercial, and leave the infant industry to struggle along as best it may under the guidance and in the hands of private citizens. After the fabulous sums that have been spent in furtherance of our air program the country will certainly resent the scrapping of our vast resources of aeroplanes and equipment, which are apparently to be thrown on the market in casual manner as salvage. Aviation undoubtedly has a wonderful future both commercially and as a sport, but it will need careful fostering for months and years to come, and this fostering only the government is in a position to supply. Great Britain and several continental countries have already learned this lesson and are putting state resources behind the development of commercial aviation; but so far only the Post Office Department seems to be showing an equal interest over here.—Editorial in New York *Globe*.

Congress Should Establish an Aeronautical Policy

ALTHOUGH the aeroplane is an American invention, the United States was hopelessly outclassed at the beginning of the European struggle in the development and application of what has proved a sensationally successful weapon of war and is sure to play an increasingly important part in peace.

When we entered the conflict in 1917 we had no aeroplanes worth talking about, no aeroplane factories of consequence, no aeroplane motors. We had to begin at the bottom of the industry and learn its processes step by step. We had generous helpers in the nations that had been fighting Germany. They laid their experience before us and gave us the advantage of their researches, their errors and their triumphs.

The United States made many blunders, costly mistakes and futile experiments in its aeroplane endeavor. But after a time we began to produce aeroplanes as good as any other nation could turn out, with pilots and observers second to those of no other country. To do this cost us hundreds of millions of dollars, which nobody begrudges, and scores of promising lives, which all regret.

As the armistice was signed the United States was prepared to take and told its proper place as the leading nation in aeroplane production and in the military use of aeroplanes. A sane and intelligent public policy would keep it in that leadership, war or no war.

Has the Administration adopted such a policy? Has it sought to encourage experiment, to encourage improvement, to encourage national enterprise in airships?

It has not.

Instead, as the facts and figures disclosed by Senator New of Indiana in *The Sun* yesterday show, the Administration has set out to wreck the costly structure of production built up during the war, to scrap the material on hand, to disband the organization of experts laboriously gathered together, and to discourage continued efforts in the field of incalculable importance to America as a nation and to Americans as individuals. The Administration is abandoning all that has been gained, and unless its purpose can be frustrated it will reduce us to the humiliating situation we were in before the war.

This folly can be avoided. The United States can be kept where it belongs in aeronautics. America's achievements in the air can be utilized as the foundation for greater successes in the future. And these things can be done immediately by the calling of Congress in special session, so that the representatives of the American people can adopt and put in force a military and naval aeronautical policy which shall protect the nation and promote its interests in a great industry of the future.—Editorial in New York *Sun*.



The News of the Week



Major Macauley Flies 2,400 Miles in 17 Hours

Americaus, Ga., April 17.—Major T. C. Macauley arrived at Souther Field on April 16 from San Diego, Cal., making the flight of 2,400 miles in nineteen hours, with one stop at Fort Worth, Tex. His speed averaged 137 miles an hour.

He had been closely following a storm moving to the east, and overtook it on the Florida-Georgia line, turned about and came back to Souther Field.

He made four stops, at Tucson, Sweetwater, Fort Worth and Americus.

Newark Firm Announces Aerial Merchandise Delivery Service to Asbury Park

The L. S. Plaut & Co. department store of Newark announced on April 19 that, beginning next Monday, it would make aeroplane deliveries of merchandise to customers at Asbury Park. It was announced that a Newark-built Wittemann-Lewis Aircraft Corporation aeroplane would be used, and that the pilot would, at the beginning of the flight, circle Military Park in Newark, dropping Victory Loan leaflets and an envelope containing a $50 Victory bond.

Brazil Appropriates $500,000 for Civil and Military Aeronautics

Brazil will spend half a million dollars this year for advancing aviation, a Rio de Janeiro dispatch announced recently.

The ministry of war will use the sum in organizing an aviation service, buying aeroplanes, establishing aviation schools and purchasing necessary supplies, it was stated.

The service will be operated for civil needs, but will be ready for war purposes.

Aeroplane Used to Locate Home Site

Palm Beach, Fla.—William Van Alen, of Severance & Van Alen, architects, rerently was called upon by a client to select the most advantageous position for the location of a new villa. The property extends from the ocean to Lake Worth and comprises about twenty acres. At the present time it is practically impenetrable on account of the jungle which runs through it, connecting up some low land containing water, which requires filling in. The central road bisecting the property did not afford a sufficient point of vantage to determine the contour of the property. The advantage of using an aeroplane for the obtaining of this information appealed to Mr. Van Alen at once. He therefore hired a pilot from an aerodrome to take him up and they flew together over the property until Mr. Van Alen had obtained the information he sought.



B. C. Boulton, formerly of the Research Department, Department of Military Aeronautics, Authority on Stress Analysis of Aeroplanes and design of structural parts, is now Special Contributing Editor to Aerial Age

B. C. Boulton Joins Aerial Age Contributing Staff

Aerial Age is gratified to be able to announce to its readers this week that it has secured the services of B. C. Boulton, of the Engineering Staff at McCook Field as a Special Contributing Technical Editor.

Mr. Boulton's work has been in the Research Department, renamed this year the Structures and Aerodynamics Section of the Aeroplane Department, Engineering Division. His work has been on the stress analysis of aeroplanes, both those designed at the Field and the very numerous ones submitted for sand test, including the analysis of the wing cell, chassis, fuselage and miscellaneous parts. He designed and proportioned the structural members of the aeroplanes built at the field, and criticized and made recommendations for others that were submitted by manufacturers to the Government. One of the most important phases of his work was the development of the present Government methods of analysis.

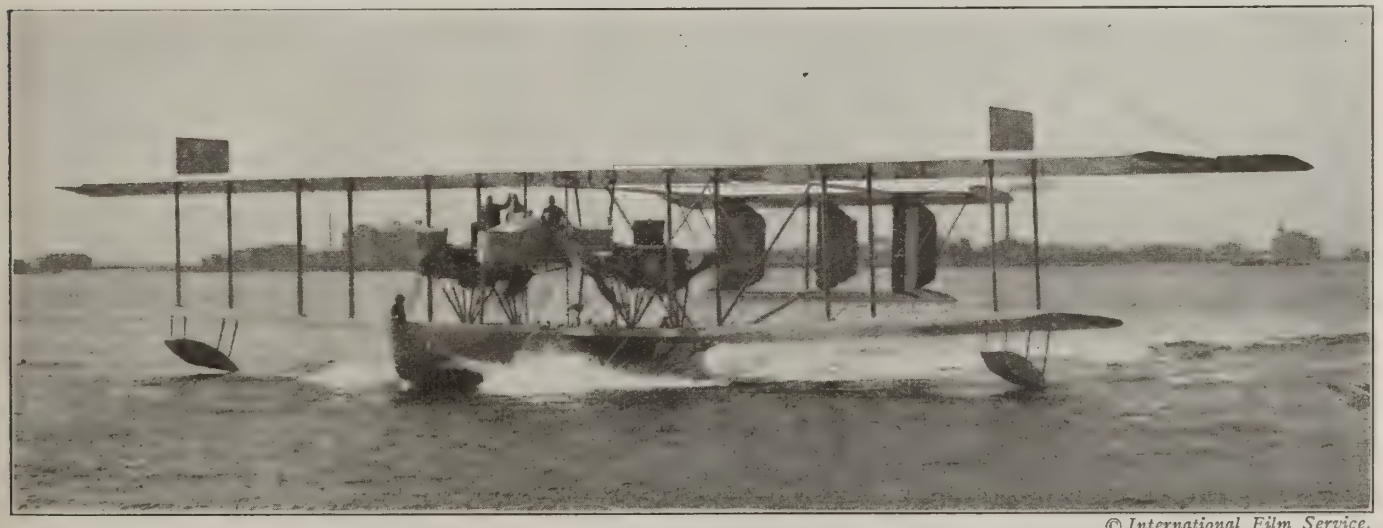
Mr. Boulton has done a good deal in devising and developing new forms of construction and in adopting new materials to aeroplane work. He has, also, been very closely in touch with the Testing Department, and has frequently been called upon to write the more important and difficult reports issued by the Testing Department.

Mr. Boulton graduated in 1916 from the Massachusetts Institute of Technology in Civil Engineering, and until going to McCook Field in November, 1917, he practiced that profession, specializing in structural work.

From the wide experience which Mr. Boulton has had, the material which he will prepare for Aerial Age will be authoritative and thoroughly up-to-date in character.

The Trans-Atlantic Flight

Three contenders in the competition for the *Daily Mail* prize have been ready for the past week to undertake the trans-Atlantic flight, but have been prevented from starting by severe weather prevailing in the North Atlantic. One of these, Major J. C. P. Wood, who will fly westward from Limerick, Ireland, came to grief on April 18 in the first step of his flight by falling into the Irish Sea en route from Eastchurch to Ireland. The forced descent resulted from a surplus flow of fuel causing carburetor trouble. Repairs, however, will be completed as rapidly as possible.



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The NC-2, powered by four Liberty motors is undergoing exhaustive tests at Rockaway Naval Air Station, in preparation for the attempt to fly across the Atlantic

On April 16 Captain C. W. F. Morgan made the first trial flight at St. John's, N. F., of the Martinsyde aeroplane, the Rymore. The test showed that the motor and radio were in good working order. Owing to the very unfavorable weather existing since that date, no further tests were made prior to April 21.

Harry G. Hawker and Lieutenant Commander Grieve are also impatiently awaiting the advent of favorable weather. Every test has been made of their Short aeroplane and its equipment, and nothing remains to be done in preparation for the flight.

The tests of the NC planes being groomed for the big flight continue. The NC-4 has been delivered by the Curtiss Company and is being assembled at Rockaway. The NC-3 will be ready for trials within a few days. It is not known how soon the NC-1 will be ready for further trials.

A trial flight of the NC-2 was made under full load on April 17, but she failed to rise from the water. No explanation was made of the failure of the trial, but a redistribution of weights is expected to remedy the trouble.

Lieutenant Commander P. N. L. Bellinger has reported to Commander Towers regarding the selection of a "jumping-off" place for the Navy fliers. It is said a site has been selected on the shores of the Bay of Biscay, on the south coast of Newfoundland.

The ninth entry for the *Daily Mail* Prize has been made by J. A. Peters, representing the Alliance Aeroplane Company. Mr. Peters is to act as pilot, and will be accompanied by Captain N. R. Curtiss as navigator and assistant pilot. The plane is a 450 horse power biplane.

Lieut. Fontan made another start on April 19 for Casablanca, on the west coast of Morocco, from where he will attempt to fly to South America, but no information has been received confirming his safe arrival at that point.

It is reported that the Handley Page biplane, which has been entered by the manufacturers, has been prepared for transport, and will be ready for the flight by the middle of May.

Mr. Sydney Pickles (retired Flight-Lieutenant, R.N.A.S.) has handed in his entry for the Atlantic flight at the Aero Club.

He will, says the Central News, make an attempt to fly from St. John's, Newfoundland, early this month in a Fairey patent variable wing aeroplane, and he hopes to accomplish the journey to Southampton in fourteen hours. Mr. Pickles is a young Australian, who took part in many bombing raids on Ostend and Zeebrugge.

First American-Built Battle Plane De H. 4, Shown By U. S. National Museum

Washington, D. C.—The U. S. National Museum now has on exhibition the first American-built battle plane constructed in this country for the U. S. Government. This plane was constructed in Dayton, Ohio, by the Dayton-Wright Aeroplane Company, and was completed on October 29, 1917. It is the first plane flown with a Liberty 12 motor. The De H. 4 was adopted by the United States Government in 1917 for use by the American Expeditionary Forces as a day-bomber and observation plane. It was first flown on the day of its completion at the South Field of the Dayton-Wright Company in Ohio. Since that time it has been used for all military tests and experiments intended to improve the De H. 4. In all, more than 2,600 experiments, ranging from motor tests and different propellers to slight changes in control surfaces, have been made on this machine.

The machine carries full military equipment, including ten No. 25 bombs, camera, wireless telegraph and generator, oxygen bottles and helmets, intercommunicating telephone, heated clothing and generator, and armament consisting of two Lewis and two Marlin machine guns.

About eighteen hundred of these aeroplanes were delivered to the Army in France and they were used extensively on the front for day bombing and observation work.

Bleriot-Spad at Indianapolis Speedway During International Race

Andre Boillot will fly the latest type of French battleplane at the Indianapolis race meeting on May 31. Boillot was given a Croix de Guerre for his service at the front. For the last twelve months he has been chief test and experimental pilot for the Bleriot Company.



The first American-built battleplane—a De Haviland made by the Dayton-Wright Company—on display at the permanent exhibit in the U. S. National Museum at Washington

Civilian Flying Licenses Issued By Joint Army and Navy Board of Aeronautic Cognizance

The following licenses have recently been issued:

License No.	Issued to	Address
334	C. J. Zimmerman,	Keyport, N. J.
343	J. B. Porter,	Wabash, Indiana
377	Leon D. Smith,	Millterton, Pa.
380	Pomilio Bros. Corporation,	New York City.
381	Fort Worth Aerial Transportation Co.,	Fort Worth, Texas.
382	Morse D. Levitt,	New York City.
383	William L. Lamkin,	Porterville, Calif.
384	Northeastern Balloon Co.,	Newburyport, Mass.
385	Lamont A. McDowell,	Elizabeth, N. J.
386	Robert Bruce McGill,	San Francisco, Calif.
387	Harold C. Brooks,	Wabash, Ind.
388	V. P. Hollingsworth,	Wabash, Ind.
389	Henry F. Fawcett,	Wabash, Ind.
390	The Cameron Aerial Co.,	Cameron, Missouri.
391	Joseph M. Pallissard,	Dayton, Ohio.
392	The Curtiss Eastern Airplane Corp.,	Philadelphia, Pa.
393	George H. Watkins,	Cambridge, Mass.
394	Carl H. Duede,	Stuart, Iowa.
395	S. A. Purcell,	San Francisco, Calif.
396	James Dazill McKee,	Pittsburgh, Pa.
397	David R. Baker,	New York City.
398	Alexander Seversky,	New York City.
399	E. Clark Harter,	Wenona, Ill.
400	Arthur W. Fox,	Rockaway, N. J.
401	Everett K. Davey,	Rockaway, N. J.
402	John H. Hughes,	Macon, Georgia.

Aerial League of West Virginia to Aid Loan Campaign

Charleston, W. Va.—A group of citizens, some of whom served as aviators in France during the war, have formed the Aerial League of West Virginia for the purpose of fostering aviation in that state.

The League has offered to supply aviators for the Liberty Loan Committee during the campaign, when it was learned that the arrangement for exhibition flights for large cities could not be effected by the committee for West Virginia, it being considered too inaccessible for transportation of the equipment.

The League's organization embraces the entire state. Lieutenant L. W. Frankley is president of the League, Lieutenant W. Beall vice president, Mr. O. R. Bush treasurer, and Mr. E. M. Arbuckle secretary.

Doctor Orders Curtiss Plane for Making Professional Calls

Beaver City, Neb.—Dr. F. A. Brewster, of this city, is going to make his long professional calls in the future by aeroplane. The aeroplane has been ordered from the Curtiss Aeroplane and Motor Co. It will be piloted by Wade Stevens, of this place, a former lieutenant and instructor in the aviation branch of the army.

Dr. Brewster holds the distinction of being the first physician to purchase a plane for this use. He has a wide practice in Nebraska, and many of his calls make necessary long trips by automobile or train. He believes that the aeroplane will solve for him the question of bad roads and inconvenient train schedules.

Government Building Helium Plant Near Fort Worth

Washington.—A helium plant is being constructed by the Government at North Fort Worth, Tex., to provide helium gas for airships. The plant will cost $900,000. The products of certain natural gas wells in Clay County, Tex., have been found best suited for the extraction of helium, and pipe lines will be arranged to Fort Worth.

Japanese Air Commission Visiting Army Fields

Mineola, L. I., April 21.—Admiral K. Yoshida, Lieutenant Commander Y. Yeyeda, Lieutenant Commanders Kono and Sugi, Professor Subara and Engineer T. Iwaski, members of a Japanese mission who have been visiting army and navy aeronautical stations throughout the country, were at Hazelhurst Field on April 21. Colonel B. M. Atkinson put a squadron of aviators through a series of stunts.

Aero Club Organized in Grand Rapids

Grand Rapids, Mich.—An aeronautical association with a purpose of promoting aerial activity was organized in Grand Rapids recently with a charter membership of thirty-two. It is hoped to arrange for the establishment of a municipal aerial landing place in Grand Rapids in the near future.

B. A. Hathaway was chosen temporary president. R. I. White and Howard Baxter were elected vice presidents; M. Jewell Clark, treasurer; Fred E. Goodall, secretary, and Francis D. Campau, counsel.

Army Balloons Start On Metereological Test Flight

Omaha, Neb., April 17.—Two United States army balloons started at midnight on an experimental flight in high altitudes, with a view to testing meteorological instruments.

Lieutenant Colonel W. S. Wuest, commanding officer at Fort Omaha, and Lieutenant Ralph A. Reynolds accompanied the balloon, which was consigned to an altitude of 5,000 feet. Captain F. W. Goodale and Lieutenant C. L. Leroy Meisinger were in the craft selected to register 10,000 feet.

After being aloft for from forty-eight to seventy-two hours at the selected levels, the airships reported safe landings, one at Cabot, Ark., and the other at Orola, Miss.

Howard E. Coffin Returns

Washington, D. C.—Howard E. Coffin, former chairman of the Aircraft Board, returned to Washington from a trip to Europe, taken to examine aircraft developments and tendencies. He was much impressed by the extensive plans of the European governments for direction and encouragement of aerial transit along both military and commercial lines. Every encouragement is being offered to commercial developments, says Mr. Coffin, and Britain intends, evidently, to seek both the military and commercial supremacy of the air. The elaborateness of the plans being laid for the encouragement and regulation of aviation is quite beyond comprehension on this side of the ocean.

Lieut. S. B. Vrooman, Named in Hughes' Report Exonerated by Attorney General

Washington, D. C.—Attorney General Palmer announced here that there will be no prosecution of Lieutenant S. B. Vrooman, who was declared by the Hughes report on aircraft production to have been regarded as having violated a section of the Criminal Code prohibiting any person acting for the Government in transacting business with a corporation in which he is interested. The Attorney General explains that his action in refusing to prosecute the officer is based on new testimony which entirely satisfies him that Lieutenant Vrooman was in no way responsible for the inspection at the Vrooman plant, and that he is not even technically guilty of having violated the Criminal Code.

"I am quite sure," says the Attorney General's statement, "that if the testimony now before me had been before Justice Hughes and Attorney General Gregory, they would not have reached the conclusion they did.

"Lieutenant Vrooman was in charge of the inspection of propeller lumber, including mahogany. The S. B. Vrooman Company, in which he was financially interested, was one of the companies which furnished such lumber to the Government. It was not claimed that he actually inspected any of the lumber furnished by that company. He did, however, select inspectors, or, at least, the managers of the district offices, who, in turn, selected the inspectors.

"Judge Hughes reported that, because those who did the actual inspection at the Vrooman plant, as well as others, were responsible to him for the efficiency of the inspection, he was the agent of the Government directly responsible for the proper inspection of the mahogany delivered by the S. B. Vrooman Company to the Government, and that acting in the capacity he violated the law. Attorney General Gregory, in transmitting Judge Hughes' report to the President, concurred in the conclusion.

"It appears, however, that Lieutenant Vrooman, after the publication of the report, claimed that neither he nor the men under him were responsible for the inspection at the Vrooman plant. He had testified that all the lumber furnished by this company was furnished under contracts originally made with the British Government, and taken over by our Government, and that the inspection was under the original British contracts, and not under aircraft specifications.

"His claim was that he meant to say that inspection was not only under different specifications, but that it was itself made not by the organization of which he was in charge, but by Inspectors of the National Hardwood Lumber Association, over which he had no jurisdiction. This, evidently, was not what either Judge Hughes or Attorney General Gregory understood from the statements made.

"After Lieutenant Vrooman made his complaint, Attorney General Gregory ordered a further investigation to be made to ascertain whether, in fact, either Lieutenant Vrooman or the men under him had any responsibility for the inspection at the Vrooman plant. This investigation, consisting of the taking of testimony of several witnesses under oath, was not completed in time for Attorney General Gregory to pass on the matter before retiring from office. It is now my duty to institute prosecution against Lieutenant Vrooman unless this additional investigation shows that the claim made by him after the publication of Judge Hughes' report is true.

"I have carefully examined the testimony on this point, and it leaves no doubt that the inspection of the lumber furnished by the Vrooman company to our Government under the British contracts was not made either by Lieutenant Vrooman or by the men under him. It was made by inspectors of the National Hardwood Lumber Association, who were entirely independent of him. The utmost that any man under him did was to receive the inspectors' reports and transmit them to authorities at Washington other than Lieutenant Vrooman.

"Under these circumstances, I am quite sure that if the testimony now before me had been before Judge Hughes and Attorney General Gregory they would not have reached the conclusion they did. The testimony entirely satisfies me that Lieutenant Vrooman was in no way responsible for the inspection at the Vrooman plant, and that he is not even technically guilty of having violated Section 41 of the Criminal Code. This completely vindicates him, and there will be no prosecution."

Curtiss Plane Aids Actors' Fund

Mrs. George McManus, wife of the cartoonist and star in "The Newlyweds" when it was staged, rode over the Polo Grounds during the field day for the Actors' Fund of America on April 13. She accompanied Roland Rohlfs, Curtiss test pilot, in an army training plane, which was donated for the occasion by the Curtiss company. When over the field and from an altitude of 300 feet, Mrs. McManus dropped an autographed baseball which was auctioned off.

Book Review

"How to Build a Scout Monoplane." Compiled by George D. White.

A scout monoplane built in the home workshop. This comprehensive pamphlet is written without use of technical terms so that any young aeronautical enthusiast can readily understand its contents. It treats of wing construction, covering of the wings, streamlining the fuselage, controls, power plant and assembly.

This valuable publication can be purchased at The Aeronautic Library, Inc., 299 Madison Avenue, New York City, at a price of 30 cents, including postage.



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The latest addition to the police force of Venice, California, is an aeroplane. A member of the force has been sworn in as pilot

The AIRCRAFT TRADE REVIEW

Curtiss Company Delivers Planes Under Own Power

Inaugurating a policy which will be followed by the Curtiss Aeroplane and Motor Corp., in delivering aeroplanes to purchasers under their own power, the first MF flying boat was flown to Atlantic City recently. Lawrence Leon, Curtiss pilot, who was instructor in cross-country work and acrobatics for two years at Call Field, piloted the boat. He was accompanied by Ensign James L. Wheeler of the United States Naval Flying Corps.

The start was made from Rockaway at 1 o'clock in the face of a stiff head wind and, after losing their way in the fog, the two pilots arrived at Atlantic City at 3 o'clock.

The boat will be used by the Curtiss Aeroplane Company in carrying passengers. Ensign Wheeler has been engaged by Earle Ovington, president of the Curtiss Aeroplane Company, as pilot.

Standard Parts Officials Back From Service

Capt E. R. Finkenstaedt, formerly active in the production of the Liberty truck for the government at Washington, has resumed his duties as assistant to President Christian Girl. Major Lewis P. Kalb, until recently in charge of designing, testing and specification work in the engineering division of the Motor Transport Corps, has joined the engineering staff of the company as assistant director of engineering, and Capt. A. L. Watts, in charge of the specification and record section of the engineering division of the Motor Transport Corps, has also joined the engineering staff. Both Lieut. Rex Gosling, who before entering service was purchasing agent of the Standard Welding division, and Lieut. Ray Jones, who gave up his position as production manager of the Perfection Spring divisions to enlist in the navy, have returned to their respective plants.

Czecho-Slovaks Purchase $1,000,000 Worth of American Planes

Washington, D. C.—It is reported here that the sale of $319,000 worth of planes and $600,000 worth of equipment recently announced was made to a representative of the Czecho-Slovak government.

Central School of Aviation Has New $100,000 Building

Pittsburg, Kansas.—The Central School of Aviation, at Pittsburg, Kansas, has recently occupied its new $100,000 building. The school is affiliated with the Pittsburg Automobile and Tractor School and incorporated in the State of Kansas.

Two army aviators, Lieutenants Water and Montgomery, have been added to the faculty. Two new planes are being added to the present equipment.

New Detroit Warehouse for Aluminum Company

Detroit.—The Aluminum Co. of America, which leases a warehouse here, is about to build one of its own. A 5-acre site in the northeastern factory district has been purchased and building will start soon.

F. R. Porter, Former Chief Engineer at McCook Field, Now With Curtiss

New York.—F. R. Porter has been appointed chief motor engineer of the Curtiss Engineering Corp., Garden City, L. I., where the experimental work of the Curtiss company is carried on. He has also been appointed chief engineer of the Curtiss Aeroplane & Motor Corp., Buffalo. His headquarters will be at Garden City. For the past year Mr. Porter was chief engineer at McCook Field for the Government, and in that capacity had to handle all new inventions in connection with engines and accessories.

Motor Truck Service and Spare Parts Delivered By Aeroplane

Aerial distribution of repair parts to distributers and service stations for Service trucks has been instituted by the Service Motor Truck Co. of Wabash, Indiana. It will be handled under contract with the Service Aviation Training & Transportation Co., a separate organization formed by stockholders of the Service Motor Truck Co. J. P. Porter, chief pilot, was formerly of the Royal Flying Corps and was one of the instructors at Love Field Aviation Camp, Texas. Assistant pilots are Harold C. Brooks and V. P. Hollingsworth. Oscar Bricker, formerly of Love Field, is in charge of the hangars and landing field. A 44-acre field has been prepared for landing. Curtiss JN-4 planes will be used.

Status of Outstanding Orders and Principal Items of Equipment Issued for Air Service

(Prepared by Statistics Branch, General Staff, War Department, April 12, 1919.)

Includes all articles of equipment on outstanding contracts on March 28, 1919, except aeroplane bombs and clothing.

DELIVERIES OVER 90 PER CENT OF ORDERS

	Orders	Deliveries	Per Cent
De Havilland 4 planes	4,846	4,842	99.9
Compasses	12,650	12,644	99.9
Cameras—gunnery training	1,609	1,599	99.3
Oak lumber (1000 ft.)	311	308	99.0
Balloons, kite, type "R"	910	898	98.6
Spare train propellers	33,631	33,064	98.3
Gum yokes	20,607	20,007	97.1
Oxygen apparatus	6,100	5,609	92.0
Lewis machine guns	43,950	40,294	91 7
Vickers machine guns	18,125	16,366	90.3

DELIVERIES 51 TO 90 PER CENT OF ORDERS

	Orders	Deliveries	Per Cent
Motor lorry outfits	77	69	89.6
Aeroplane fabrics (1000 yds.)	11,568	10,263	88.7
Hispano 180 H. P. engines	6,000	5,075	84.5
Handley P. laminations	2,000	1,660	83.0
Hydrogen cylinders	172,800	142,300	82.3
Cameras—observation	1,351	1,051	77.8
Oxygen tanks	17,000	13,077	76.9
Synchronizing devices	24,226	17,650	72.9
Bomb sights	16,544	11,630	70.3
Bomb releases	15,850	10,362	65.3
Flare bracket holders	23,037	14,542	63.1
Cherry lumber (1000 ft.)	1,006	618	61.4
Gasoline gauges	1,450	858	59.2
Cable (1000 ft.)	3,340	1,720	52.0
Flares	162,248	83,000	51.2
Winches	236	121	51.2

DELIVERIES LESS THAN 51 PER CENT OF ORDERS

	Orders	Deliveries	Per Cent
Cotton tape (1000 yds.)	15,090	7,339	48.6
Balloon fabrics (1000 yds.)	13,764	6,664	48.4
Walnut lumber (1000 yds.)	10,354	4,649	44.9
Mahogany (1000 ft.)	22,352	9,984	44.7
Balloon equipment units	400	87	21.8
Hispano 300 H.P. engines	500	101	19.2



The Curtiss Eastern Aeroplane Company has opened the first aeroplane sales room in Philadelphia. The plane on view is a Curtiss JN-HD-2

U. S. Rubber Profits $16,072,042

New York, N. Y.—The U. S. Rubber Co. announced a record-breaking net profit of $16,072,042 for 1918. Sales increased from $176,159,694 to $215,398,425.

New Standard Parts Factory at Flint

Cleveland.—A new spring factory is under construction for the Standard Parts Co. at Flint. It will replace the company's present Flint plant, long since outgrown. The new factory will have an immediate capacity four times greater than that of the old plant.

Air Service Contracts Concelled and Suspended, Over $500,000,000

(Prepared by Statistics Branch, General Staff, War Department, April 12, 1919.)

During the week ended April 5, 1919, the total Bureau of Aircraft Production obligations were reduced over $4,000,000, making a total of cancelled and suspended contracts of $500,679,617 since the armistice. The following is a summary of the value of cancellations and suspensions of contracts through April 5, 1919:

	Value	*Per cent of total*
Engines and spare parts	$275,616,187	55
Aeroplanes and spare parts	166,081,004	33
Chemicals and chem. plants	18,334,715	4
Instruments and accessories	10,868,841	2
Balloons and supplies	9,314,963	2
Fabrics, lumber and metals	7,228,778	1
Miscellaneous	13,235,129	3
Total	$500,679,617	

Aeronautical Instrument Co. to Make Claudel Carburetors

The Aeronautical Equipment Co. has contracted with the Claudel Co. of France for the American rights to manufacture the Claudel carburetor. The contract calls for a minimum of 20,000 carburetors for the first year, progressing through a minimum of 100,000 carburetors in the sixth year. The company expects to exceed these figures very considerably.

Personal Pars

Amel R. Carlson, who has completed his government service on the purchasing staff of the Wright-Martin Aircraft Corp., New Brunswick, N. J., has returned as assistant general manager to the Commonwealth Motors Co., Chicago.

LeRoy A. Hillman will be in charge of the branch of the Detroit Pressed Steel Co., which has been opened here for Disteel wheels. Mr. Hillman has been in civilian service with the Bureau of Aircraft Production, and before that operated The Bearings Shop, interest in which he still retains.

M. W. Bartlett, for the past five years secretary of the Splitdorf Electrical Co., has joined the Wire Wheel Corp., of America as Eastern District representative, with headquarters in New York at 835 Eleventh Avenue. Service direction and export matters are also under his supervision.

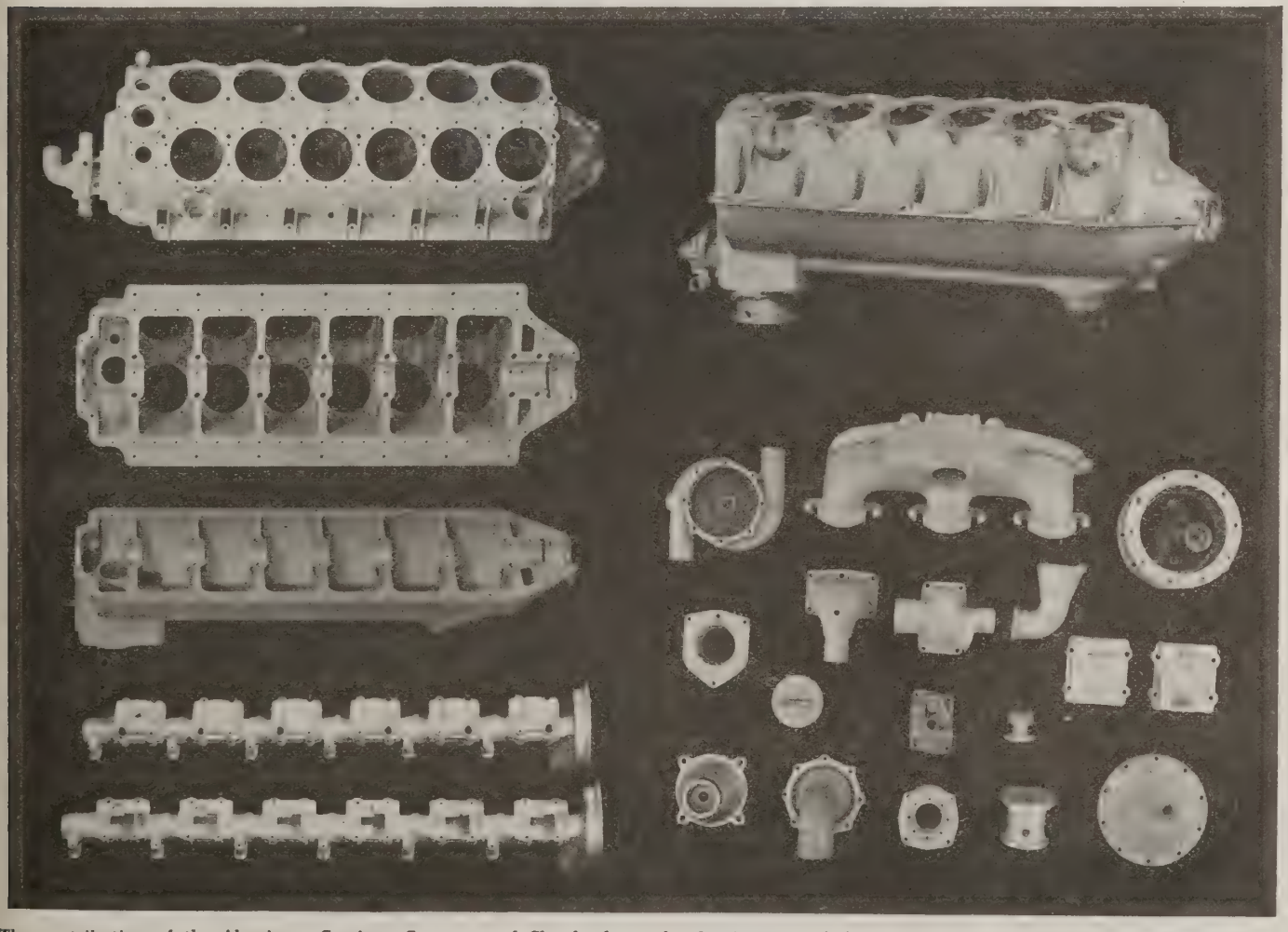
E. O. Bennett, formerly stationed at the research laboratory, National Advisory Committee for Aeronautics, Langley Field, Hampton, Va., is now associated with the engineering department of the Standard Oil Co., San Francisco, Cal.

Walter O. Adams has resigned as plant manager of the Erie Specialty Co., Erie, Pa., and has opened an office at 1038 Dime Bank Building, Detroit, Mich., as mechanical-chemical engineer, specializing in production and sales.

A. L. Clayden has resigned as consulting engineer of the Wright-Martin Aircraft Corporation, New Brunswick, N. J., and will sail shortly for London, where he will open an office as consulting engineer. He plans to specialize in European investigations for American companies in the automotive field, and will spend a portion of each year in this country.

Lee C. Carlton has resigned as Chicago branch manager of the American Bosch Magneto Corporation, and has been appointed mid-West manager of the Ericsson Mfg. Co., with offices in the Century Building, that city.

Charles E. Barton is now associated with the engineering department of the Lincoln Motor Co, Detroit, Mich. He was formerly in the service of the Government, in the Bureau of Aircraft Production, and was stationed at McCook Field, Dayton, Ohio.



The contribution of the Aluminum Castings Company, of Cleveland, to the development of the Liberty Motor. Excellent examples of the castings which this company made

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative

PILOTS

Dana C. DeHart
Edward V. Gardner
Robert F. Shank
Ira O. Biffle
Leon D. Smith
Gilbert G. Budwig
Trent C. Fry

John A. Jordan, Superintendent, Western Division
Paul L. Ferron, Manager, Belmont Park
Harry W. Powers, Manager, College Park
Lowell S. Harding, Manager, Bustleton
O. J. Sproul, Manager, Chicago
W. J. McCandlass, Manager, Cleveland

PILOTS

E. Hamilton Lee
Lester F. Bishop
Carroll C. Eversole
Charles I. Stanton
John M. Miller
Max Miller
Charles E. Bradley

Edward V. Gardner

Edward V. Gardner was one of the first civilian pilots in the Postal Aero Mail Service and has served on the Washington, Philadelphia and New York route since the military were replaced by civilian pilots. He has never missed a single trip since entering the service. Though he has flown in all sorts of weather, battling fierce storms and winter gales which at times retarded his flight, he has not once failed to deliver the mail on the New York-Washington route. Piloting a postal aeroplane, he was the first to make a cross-country flight from Chicago to New York in one day. This flight he made in seven hours and forty-six minutes.

Mr. Gardner's home is at Plainfield, Illinois. He began his career of speeding in auto races during 1911, taking part in races on all of the principal tracks in the United States, as a driver of National and Mercer cars, and giving exhibitions until 1915. That year he took up flying, receiving his instruction at the Curtiss School at Hampton, Va. When the war was declared he was employed as civilian flying instructor at Chanute Field, Rantoul, Ill. Until 1917 he was student instructor, and was then promoted to junior instructor and was transferred to Love Field, Dallas, Texas, December 15, 1917. In February, 1918, he was promoted to senior instructor, giving advanced instructions in cross-country flying. Resigning as instructor on August 1, 1918, he was employed as aerial mail pilot by the Post Office Department.

Post Office Department Issues Specifications for 10 Mail Planes

Washington, D. C.—The Post Office Department has asked bids for ten mail planes to be built according to specifications, which follow. The minimum capacity is to be 1,500 pounds, but preference will be given to planes having from 2,000 to 3,000 pounds capacity. Bids will be opened June 2, and deliveries to be made within six months after letting contracts. Bidders are to agree to furnish planes in lots of six at the price specified up to June 30, 1920.

The specifications are as follows:

General Requirements

1. *Fundamental Requirements.* Should be a radical departure from military designing, making the following qualities of primary importance:
   a. Inherent stability in power and glides.
   b. Machine to be balanced for cruising speed, altitude 6,000 ft.
   c. Controllability and wide vision.



Edward V. Gardner, who has been a mail service pilot since the Post Office Department has employed civilian aviators

2. *Performance* (Normal Load).
   a. Efficient cruising speed of 90-100 m.p h. at 6,000 ft.
   b. Cruising radius of 5 to 6 hours.
   c. Buoyancy speed of 50 m.p.h. *or less.*
   d. Low landing speed either inherent or mechanical.
   e. Ceiling of about 15,000 ft.
   f. Capable of horizontal flight or climb on one-half normal maximum power.
3. *General Requirements.*
   a. Two or more motors.
   b. Mail load of 1,500-3,000 lb. at 17½ lb. per cu. ft.
   c. Crew of one pilot and one mechanic on two-motored planes, and two pilots and one mechanic on three-motored planes.
   d. A method of retracting or hinging wings for storage with wing spans over 80 ft. Optional.
   e. Overall height of 18 ft.
   f. To be capable of easy assembly and disassembly.

Detailed Construction

1. *Power Plants.*
   a. To be independent power plants.
   b. Accessible for major repairs or removal.
   c. Accessibility for minor repairs during flight.
   d. An approved motor starter system.
   e. Complete radiator shutters adjustable from pilot's seat.
   f. A compression release to be provided for each motor.
2. *Fuselage.*
   a. Preferably a removable mail cage which may be drawn up into fuselage recess.
   b. Steerable tail skid to be optional with builder.
   c. Two tail skids to be provided in tandem; that is, one behind the other, with universal joints, if practicable.
   d. In flight, fuselage to withstand a loading of 30 lb. per sq. ft. on horizontal tail surfaces and 20 lbs. per sq. ft. on vertical tail surfaces.
   e. Fuselage to have landing factor of safety of 12-15.
   f. Accessibility of all tanks, leads, controls, etc., during flight.
   g. Variable loads at center of gravity.
3. *Wings.*
   a. Approved construction.
   b. Factor of safety of 6.
   c. Extra strength wing skids hinged with shock absorber of rubber.
4. *Landing Gear.*
   a. To have a factor of safety of 15 in all members.
   b. Center of gravity to be as far back of landing gear as possible.
   c. Elimination of any tendency to nose over.
   d. Landing gear to give adequate support to motors.
5. *Controls and Control Surfaces.*
   a. "Dep."
   b. All controls to be readily accessible for maintenance and repair.
   c. All control surfaces to be balanced where necessary for easy handling.
   d. Emergency control to be provided with removable stick.
   e. Variable horizontal stabilizer to be provided and balanced at neutral point with standard load.
   f. Internal controls designed to be free from danger of ice.
6. *Gas and Oil.*
   a. An independent gas and oil supply for each motor, with intercommunication leads.
   b. An absolutely reliable gas feed system such as provided by mechanical vane pumps and central hand pump as auxiliary.
   c. Accessibility to all valves and leads, both oil and gas, for repairs while in flight.
   d. Strongly anchored tanks.
   e. All leads to be protected against vibration.
7. *Safety and Comfort of Crew.*
   a. Pilot and pilot mechanic to be placed behind main leads, or preferably to be placed oved loads in streamline at top of fuselage.
   b. That provisions be made for protection against bad weather.
   c. A passage way to be provided, so that vital parts are accessible to mechanic in flight.
   d. That suitable slideways and eyes be provided for belt and snap hook to be worn by mechanic in making repairs in exposed places.
   e. Suggested that streamlining on exposed power plants be hinged at front and of sufficient width and length to provide shelter for mechanic while working on motor. To be held out by suitable, adjustable strut.
   f. That room be available in control cockpit for map boards, instruments and radio controls.
   g. That a good fire extinguisher system be provided, such as Pyrene or equal, tubed by suitable leads to gasoline tanks and all other motor compartments, to be operated from control cockpit.
   h. That pilot's seat be adjustable in relation to controls.

Atlantic City Hotels Co-operating to Make Convention and Contests Great Success

THE leading Atlantic City hotels are co-operating with the management of the Second Pan-American Aeronautic Exposition and Convention to make a huge success of this international event.

The Hotels listed are co-operating in many ways to make the Convention a success, and have contributed to the $50,000 Trans-Atlantic Flight prizes. We ask those who attend to recognize the assistance of these Hotels by patronizing them. Correspond with them about your accommodations.

By special arrangement AERIAL AGE is privileged to present to its readers a coupon which will entitle them to free admittance to all the aeronautic events to be held at Atlantic City from May First, to June First, including admission to the Steel Pier, where the Convention and Exposition will be held and the Atlantic City Air Port where the Aerial Contests for the sixteen prizes and trophies will start and end.

The Atlantic City Publicity Bureau has quoted and guaranteed the Hotel Rates for this Convention as herein printed.

In order to obtain an "Official Button" which admits to everything, attenders must have both (a) a Hotel or a Privilege Certificate and (b) a Membership in one of the organizations or credentials as described, or the AERIAL AGE Coupon printed below. Those who do not have the "Official Button" will be admitted to the Pier and Field upon payment of the prevailing Fees to the Public.

On arrival at a co-operating Hotel ask for your "Hotel Certificate" which will be given you without charge. If not stopping at a co-operating Hotel, you may secure a "Privilege Certificate" at the Steel Pier for Five Dollars ($5.00) which may be surrendered in lieu of the "Hotel Certificate". Present the "Hotel Certificate" (or a Privilege Certificate) at the Registration Bureau on the Steel Pier, together with your card of membership in either the Aero Club of America, The Aerial League of America, The Pan-American Aeronautic Federation, or the Atlantic City Aero Club, and receive your "Official Button". Army and Navy Officers and members of Military and Naval and Civil Commissions, and holders of the AERIAL AGE Coupon, will present the Hotel (or Privilege Certificate) to receive the "Official Button". Others not already members should pay the Annual Dues of Five Dollars ($5.00) and thus become members of The Aerial League of America. Members must present a "Hotel Certificate" (or a "Privilege Certificate") in order to secure an "Official Button". The "Official Button" will admit to the Steel Pier and the Atlantic City Aviation Field at Chelsea Heights at all times and to other affairs as may be announced.

Apply direct to hotels for reservations. State rate you prefer.

(Tear this coupon off and present to hotel manager)

AERIAL AGE FREE ADMISSION COUPON

The Bearer .....

Name .....

Address .....

is a reader of AERIAL AGE WEEKLY and is entitled to a Hotel Certificate which, when presented at the Registration Office on the Steel Pier, entitles holder to secure an Official Button. This Official Button will secure admission to all aeronautic events to be held on the Steel Pier at the Alantic City Air Port during the month of May, 1919.

G. DOUGLAS WARDROP,
Managing Editor.

A—American Plan
E—European Plan

		Rates by the Day							
		Rooms without Private Bath				Rooms with Private Bath			
		For One Person		For Two Persons		For One Person		For Two Persons	
		In Single Room	In Double Room	In Double Room	In Extra Large Room	In Single Room	In Double Room	In Double Room	In Extra Large Room
Boardwalk	A—Royal Palace	5.00 to 7.00		10.00	11.00	9.00 to 11.00		14.00 to 20.00	
	A—Breakers	6.00	——	12.00 to 15.00		7.00 to 10.00		14.00 to 20.00	
	E—Breakers	2.50	——	4.00 to 8.00		4.00 to 7.00		6.00 to 12.00	
	A—St. Charles	6.00	7.00	10.00	11.00	8.00 to 12.00		12.00 to 16.00	
	A—Haddon Hall	5.00 to 7.00		10.00 to 12.00		7.00 to 10.00		12.00 to 16.00	
	A—Chalfonte	5.00 to 7.00		10.00 to 12.00		7.00 to 10.00		12.00 to 16.00	
	E—Regent	1.50	2.00	3.00	4.00	3.00	4.00	5.00	6.00
	A—Alamac	7.00	8.00	12.00	14.00	8.00	9.00	14.00	18.00
	E—Alamac	3.00	4.00	5.00	6.00	5.00	6.00	7.00 to 10.00	
	E—Apollo	1.50	2.00	2.50	——	2.50	3.50	3.50	——
	A—Traymore	7.00	8.00	——	13.00	9.00	——	14.00	22.00
	E—Traymore	3.00	4.00	——	5.00	5.00	——	6.00	14.00
	A—Brighton	6.00 to 8.00		12.00 to 14.00		8.00 to 11.00		14.00 to 22.00	
	A—Marlborough-Blenheim	7.00	8.00	12.00	——	10.00	11.00	14.00 to 21.00	
	E—Marlborough-Blenheim	4.00	5.00	7.00	——	7.00	8.00	9.00 to 16.00	
	A—Dennis	6.00 to 8.00		9.00 to 11.00		7.00 to 15.00		12.00 to 18.00	
	E—Shelburne	3.00	4.00	5.00	6.00	5.00	6.00	8.00	10.00
	A—Ambassador	——	——	——	——	——	10.00	14.00	20.00
	E—Ambassador	——	——	——	——	——	6.00	8.00	14.00
	A—Chelsea	6.00	7.00	11.00	13.00	8.00	10.00	14.00	16.00
Vermont Ave.	A—Touraine	3.50	4.00	7.00	——	5.00	5.00	8.00	——
	E—Touraine	2.00	2.50	3.00	——	3.50	3.50	4.00	——
Oriental Ave.	A—Glenside	3.00	3.50	5.00	6.00	3.50	4.00	7.00	8.00
	E—Glenside	2.00	2.50	3.00	3.50	2.50	3.50	6.00	7.00
Massachusetts Ave.	A—Phillips House	4.00 to 7.00		8.00 to 10.00		——	7.00	10.00 to 12.00	
	E—Phillips House	1.50	2.50	3.00	5.00	——	4.00	5.00	6.00
	E—Thurber	1.00	1.50	2.50	3.00	——	——	——	——
New Jersey Ave.	A—Pierrepont	4.00 to 5.00		8.00	9.00	5.00	6.00	10.00	11.00
	E—Lancken Cottage	1.50	2.00	2.00	2.00	——	——	——	——
St. Charles Place	A—Loraine	4.00	——	8.00	9.00	——	——	10.00	12.00
Maryland Ave.	E—Schafer Villa	1.25	——	2.00	2.50	——	——	——	——
Virginia Ave.	A—Blackstone	4.00	4.50	8.00	9.00	6.00	6.50	10.00	12.00
	E—Blackstone	2.00	2.50	3.00	4.00	3.50	4.00	5.00	6.00
	A—Majestic	3.50	4.00	6.00	7.00	——	5.00	8.00	10.00
	E—Majestic	1.50	2.00	3.00	4.00	——	3.50	5.00	6.00
	A—Berkshire Inn	3.00	3.50	6.00	7.00	4.00	5.00	8.00	9.00
	E—Berkshire Inn	1.50	2.00	3.00	4.00	2.50	3.00	5.00	6.00
	E—Romm	1.25	2.00	2.50	3.00	2.00	2.00	4.00	4.50
	A—Whittier	3.50	——	6.00	7.00	——	——	——	——
	E—Whittier	2.00	——	4.00	5.00	——	——	——	——
	A—Victor Hall	——	3.00	5.00	6.00	——	——	——	——
	E—Victor Hall	——	2.00	3.00	4.00	——	——	——	——
	A—Jackson	——	5.00	10.00	12.00	——	7.00	14.00	15.00
	E—Jackson	——	2.50	4.00	5.00	——	4.00	8.00	9.00
	A—Bothwell	4.50	5.00	8.00	9.00	——	——	12.00	14.00
	E—Bothwell	——	——	——	——	——	——	——	——
	A—Wiltshire	4.00	5.00	7.00	8.00	——	——	10.00	12.00
	A—Morton	4.00	5.00	7.00	8.00	——	——	9.00	10.00
	A—Absecon	3.00	3.50	5.00	6.00	5.00	6.00	8.00	9.00
	E—Absecon	1.50	2.00	2.50	3.00	3.00	——	6.00	——
	A—Raymond	3.00	3.50	6.00	7.00	——	——	8.00	9.00
	E—Raymond	1.50	1.50	2.00	3.00	——	——	——	——
	A—New Florence	3.50	4.00	7.00	8.00	——	——	10.00	——
	E—New Florence	1.00	1.50	3.00	4.00	——	——	5.00	——
	A—Grand Atlantic	3.00	3.50	6.00	7.00	——	6.00	8.00	9.00
	E—Grand Atlantic	1.50	2.00	3.00	4.00	——	——	——	——
	A—Shoreham	2.50	3.00	5.00	6.00	4.00	5.00	8.00	10.00
	E—Shoreham	1.50	1.50	2.50	3.00	2.50	3.00	5.00	6.00
	A—Calvert	3.50	4.00	6.00	8.00	5.00	5.50	9.00	10.00
	E—Calvert	1.50	2.00	3.00	4.00	3.00	3.50	5.00	6.00
Pennsylvania Ave.	A—Holmhurst	4.00 to 5.00		10.00	12.00	——	——	12.00	14.00
	E—Holmhurst	2.50	3.00	——	5.00	——	——	6.00	7.00
	A—Upton	3.00	3.50	5.00	6.00	——	——	——	——
	A—St. Clare	3.00	4.00	6.00	7.00	——	5.00	10.00	12.00
North Carolina Ave.	A—Colonial	3.00	4.00	5.00	6.00	3.50	5.00	6.00	7.00
South Carolina Ave.	A—DeLancey-Lakewood	3.00	——	5.00	——	——	——	——	——
	E—Rose Lynn	1.00	1.50	2.00	2.50	——	——	——	——
	A—Silverside	3.00	3.50	6.00	7.00	——	——	——	——
	A—Radnor	2.00	2.50	4.00	5.00	——	——	——	——
	E—Radnor	1.00	1.50	2.00	3.00	——	——	——	——
	A—Mullica	2.50	3.00	5.00	6.00	——	——	——	——
	E—Mullica	1.00	2.00	3.00	4.00	——	——	——	——
	A—Trexler	3.00	4.00	5.00	6.00	——	——	——	——

A—American Plan
E—European Plan

Rates by the Day

		Rooms without Private Bath				Rooms with Private Bath			
		For One Person		For Two Persons		For One Person		For Two Persons	
		In Single Room	In Double Room	In Double Room	In Extra Large Room	In Singl Room	In Double Room	In Double Room	In Extra Large Room
	A—Iroquois	4.00	7.00	7.00	8.00	—	—	9.00	10.00
	A—Princess	4.00	5.00	8.00	9.00	—	—	—	—
	E—Princess	1.00	1.50	2.00	3.00	—	—	—	—
Ocean Ave.	A—Bon Air	2.75	3.00	5.50	5.50	—	—	—	—
	A—Kingston	3.00	3.50	5.00	6.00	4.00	5.00	7.00	8.00
	E—Kingston	1.50	2.00	2.50	3.00	2.50	3.50	4.00	5.00
Tennessee Ave.	E—National	1.50	2.00	2.00	3.00	—	—	5.00	5.00
	A—Elberon	2.50	3.00	5.00	6.00	3.00	3.50	7.00	8.00
	E—Elberon	1.00	1.50	2.00	3.00	1.50	2.00	3.00	4.00
	A—Continental	3.50	4.00	7.00	8.00	5.00	6.00	7.00	10.00
	E—Continental	1.50	2.00	2.00	3.00	2.50	3.00	5.00	6.00
	E—Fredonia	1.00	1.50	2.00	2.50	1.50	2.00	3.00	4.00
	A—Greater Pittsburgh	2.50	3.00	4.00	5.00	—	—	—	—
	E—Greater Pittsburgh	1.50	2.00	2.00	3.00	—	—	—	—
	A—Beaumont	—	—	5.00	—	—	—	—	—
	E—Beaumont	—	—	2.00	—	—	—	—	—
	A—Howard House	2.50	—	5.00	6.00	—	—	—	—
	E—Howard House	1.50	—	2.50	3.00	—	—	—	—
	A—Kenderton	3.00	3.50	5.00 to	8.00	—	5.00	8.00	9.00
	E—Kenderton	1.00	1.50	2.50 to	4.00	—	3.00	4.00	5.00
St. James Place	A—Flanders	3.00	—	5.00	—	—	—	—	—
	A—Elwood	3.00	3.50	5.00	6.00	3.50	—	6.00	—
	E—Elwood	1.50	2.00	3.00	4.00	2.50	—	4.00	—
	A—Devonshire	3.50	4.00	7.00	—	—	—	8.00	—
	A—Thompson	—	2.50	4.00	5.00	—	—	—	—
New York Ave.	E—Breslin	2.00	3.00	3.00	5.00	2.50	—	6.00	—
	A—Netherland	2.50	3.00	5.00	6.00	4.00	5.00	8.00	9.00
	A—Chester Inn	2.50	3.00	5.00	6.00	3.00	3.50	6.00	7.00
	E—Chester Inn	1.50	2.00	3.00	4.00	2.50	3.00	5.00	6.00
	E—Hygeia	1.00	1.00	2.00	2.00	1.50	1.50	2.50	2.50
	E—Bingham	1.00	1.00	2.00	2.00	1.50	1.50	2.50	2.50
	A—Belleville	2.50	3.00	5.00	5.50	—	—	—	—
	E—Belleville	1.00	1.50	2.00	2.50	—	—	—	—
Kentucky Ave.	E—Martinique	2.00	2.50	3.00	4.00	5.00	6.00	7.00	8.00
	A—New Clarion	3.00	3.50	5.00	6.00	3.50	4.00	6.00 to	8.00
	E—New Clarion	1.50	2.00	2.00	3.00	2.00	2.50	3.00	3.50
	A—De Ville	3.00	—	6.00	7.00	—	5.00	—	9.00
	A—Monticello	3.50	4.00	6.00	7.00	5.00	6.00	8.00	9.00
	E—Monticello	1.50	2.00	2.50	3.00	3.00	4.00	4.00	5.00
	A—Wellsboro	2.50	3.00	5.00	6.00	4.00	5.00	6.00	7.00
	E—Wellsboro	1.00	1.50	2.00	3.00	3.00	4.00	4.00	5.00
	A—Westminster	3.00	3.50	5.00	6.00	4.00	5.00	7.00	8.00
	E—Westminster	1.50	2.00	3.00	4.00	2.00	2.50	4.00	5.00
	E—Strathhaven	1.00	2.00	1.50	2.50	2.00	2.50	3.00	4.00
	A—Silverton	2.50	4.00	—	—	—	—	—	—
	E—Silverton	1.50	2.50	—	—	—	—	—	—
	A—Richmond	3.00	4.00	6.00	8.00	—	—	—	—
	E—Richmond	1.50	2.00	3.00	4.00	—	—	—	—
	A—Carnix	2.00	—	4.00	—	—	—	—	—
	E—Carnix	1.50	—	2.00	—	—	—	—	—
Illinois Ave.	A—Craig Hall	3.50	4.50	6.00	7.00	4.50	5.50	7.00	9.00
	E—Merle Cottage	1.00	1.50	2.00	3.00	2.00	3.00	—	—
	E—N L Burkhard—125	1.00	1.50	2.00	2.50	—	—	—	—
Park Place	A—Glaslyn-Chatham	3.50	—	6.00	7.00	5.00	—	7.00	8.00
	A—Cheltenham-Revere	3.50	4.00	6.00	7.00	—	6 00	9.00	10.00
	A—Runnymede	3.50	4.00	7.00	8.00	6.00	6.00	10.00	12.00
Michigan Ave.	A—Pennhurst	3.50	5.00	7.00	8.00	7.00	8.00	10.00	12.00
	A—Arlington	3.00	3.50	5.00	6.00	5.00	6.00	8.00	9.00
	E—Arlington	1.50	2.00	2.50	3.00	—	—	—	—
	A—Edison	—	3.00	5.50	6.00	4.50	5.00	7.00	—
	E—Edison	—	2.00	2.50	4.00	3.00	3.50	4 00	—
	E—Bayard	—	1.50	3.00	4.00	—	4.00	5.00	6.00
	E—St. Francis	1.00	1.50	2.50	3.00	—	2.50	4.00	4.50
	A—Colwyn	2.00	2.50	4.00	5.00	—	—	—	—
	E—Colwyn	1.00	1.50	2.00	3.00	—	—	—	—
Arkansas Ave.	E—Terminal	1.00	2.00	2.00	3.00	3.50	4.00	4.00	5.00
	A—Emmett	2.00	2.50	4.00	4.50	—	—	—	—
	E—Emmett	75	1.00	1.50	2.00	—	—	—	—
Missouri Ave.	A—Worthington	2.50 to	3.00	—	—	—	—	7.00	—
Pacific Ave.	E—Y M. C. A.	1.00	—	1.50	—	(For members only.)			
	A—Godwin. (1510)	2.00	3.00	4.00	5.00	—	—	—	—
	E—Godwin	1.00	1.50	2.00	4 00	—	—	—	—
	A—Arondale (1514)	2.00	2.50	4.00	5.00	—	—	—	—
	E—Arondale	1.00	1.50	2.00	2.50	—	—	—	—
	A—Channell	2.50	2.75	4.50	5.00	3.00	3.25	6.00	6.00
	E—Channell	1.00	1.25	2.00	2.50	1.50	1.75	3.00	3.00
Arctic Ave.	A—Wright's Hotel (Colored)	4.00	—	8.00	10.00	—	—	—	—
	E—Wright's Hotel (Colored)	1.50	—	3.00	5.00	—	—	—	—
	A—Ridley's Hotel (Colored)	2.00	4 00	4.00	5.00	—	—	—	—
	E—Ridley's Hotel (Colored)	1.00	2.00	2.00	2.50	—	—	—	—

ORGANIZATION CHART
AVIATION SECTION, POLICE RESERVE SQUADRON
POLICE DEPARTMENT, CITY OF NEW YORK
240 CENTRE STREET, NEW YORK CITY.

CHIEF OF AERIAL POLICE
Colonel Jefferson DeMont Thompson

DEPUTY CHIEF
Major S. Herbert Mapes

PERSONNEL ADJUTANT
Captain William Menkel

COMMANDING OFFICER
Major Granville A. Pollock

ADJUTANT
Captain Theodore Arter

GROUND SECTION

FLYING SECTION

ENGINEER OFFICER - 6 MECHANICS
J. G. Stuart

1		4	
2		5	
3		6	

INTELLIGENCE & PHOTOGRAPHIC OFFICER

QUARTERMASTER & COMMISSARY OFFICER
Jack Grodner — Wm. J. Lee

RADIO OFFICER
R. M. Butler

SUPPLY OFFICER
John Robertson Hoyt

ORDNANCE OFFICER
Captain Gordon Baker

CHAPLAIN

CHIEF SURGEON - MEDICAL CORPS

1		4	
2		5	
3		6	

APPROVED BY	
COMPILED BY	MAJOR S. HERBERT MAPES

SQUADRON A - 8 PILOTS
Lieutenant Hilbert L. Bair

1	Wm. E. Skillman	5	F. J. Sweeney
2	Edgar H. Garland	6	Edward L. Smith
3	A. P. Taliaferro Jr	7	Joseph E. Morris
4	Hugh Elasser	8	E. H. Jewell

SQUADRON B - 8 PILOTS
Lieut. Frank Sefern Ennis

1	Miles E. Kellin	5	Howard B. Norton
2	J. William Frost	6	Hugo Sundstedt
3	Lieut. C. W. Kerwood	7	Wm. L. Purcell
4	James I. Crafts	8	E. C. Rowan

SQUADRON C - 8 PILOTS
Lieutenant Charles S. Jones

1	J. R. McCaffrey	5	Edward P. Frost
2	Lieut P. Micelli	6	E. C. Lobdell
3	Capt. J. C. Stehlin	7	Francis P Smith
4	Charles Siems	8	Leonard E. Mins

SQUADRON D - 8 PILOTS
Lieutenant Charles W. Myers

1	Lieut. Leigh J. Bair	5	Paul J. Hagren
2	Lester F. Bishop	6	W. H. Hamilton
3	J. B. Blandford	7	Dean Ivan Lamb
4	Lieut S. J. Mustain	8	G. C. Langstroth

SQUADRON E - 8 OBSERVERS
Horace Keane

1	Lieut. H. Kellerman	5	L. L. Petticord
2	Stephen H. Kelly	6	J. A. Roe, Jr.
3	Lieut C. R. Collins	7	Lieut. J. A. Ronan
4	Lieut. H. A. Peterson	8	Lieut. A. H. Smith

THE BRITISH A. B. C. AERO ENGINES

IT is now possible to publish preliminary descriptions and photographs of the three different A.B.C. aircraft engines. The whole of these have been developed during the war, although it is not believed that the Gnat was originally intended for the propulsion of aircraft. The outstanding feature of the A.B.C. models is the copper coating of the cooling fins. It was not believed possible at one time to construct an efficient, air-cooled engine of greater cylinder bore than 4½ in., owing to the difficulties of cooling which were encountered. Judging, however, from practical results, the A.B.C. will eventually enable the economical use of much larger air-cooled cylinders than have previously been possible.

The Gnat (Mark 2) engine is of the two-cylinder, horizontally opposed type of 4¾ in. bore by 5½ in. stroke. Operating at the normal speed of 1,800 r.p.m., an output of 45 h.p. is obtained, 50 h.p. being possible at the maximum speed of 2,000 r.p.m. Running at its normal speed, the engine consumes

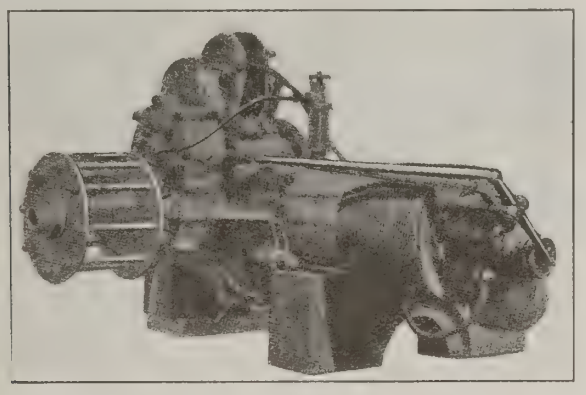


Fig. 1. Three-quarter side view of 45 H.P. "Gnat II"

0·56 pints of petrol per b.h.p. per hour, and 0·037 pints of oil per b.h.p. per hour—a very satisfactory performance for an air-cooled engine. The weight of this engine, complete, is 115 lb., corresponding to a specific weight of 2·3 lb. per b.h.p.

The Wasp (Mark 2) engine is of the seven-cylinder fixed radial type of 4¾ in bore by 6¼ in. stroke, developing a normal output of 200 h.p. at 18,000 r.p.m. Two carburetors

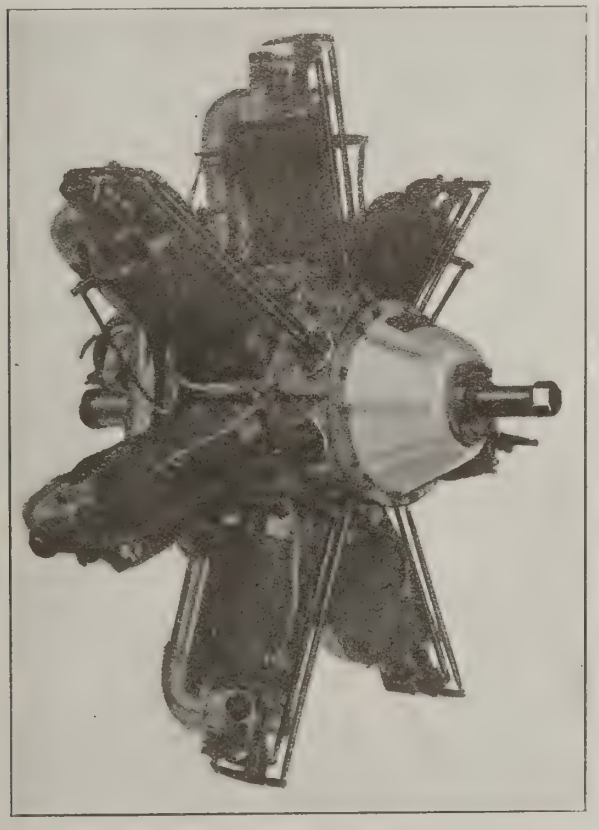


Fig. 2. 170 H.P. "Wasp I"

are fitted, feeding into a circular induction manifold from which separate radial pipes lead to each cylinder. The weight of this engine is 320 lb., giving 1·6 lb. per b.h.p.

The A.B.C. Dragon Fly (Mark A1) is also of the fixed radial air-cooled type, but of nine cylinders, each 5½ in. in

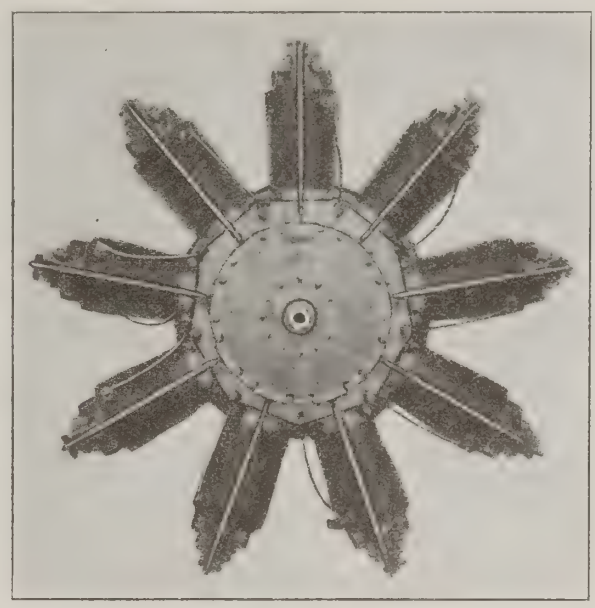


Fig. 3. Front view of 350 H.P. "Dragon Fly"

bore by 6½ in. stroke, and normally developing 340 b.h.p., at 1,650 r.p.m. The weight of this model is 600 lb., corresponding to approximately 1¾ lb. b.h.p. The fuel consumption of both the Dragon Fly and the Wasp are substantially the same as for the Gnat, given above.

Very little information is, so far, available concerning the detailed construction of the A.B.C. engines. The copper coating of the steel cylinders has already been referred to. Beyond

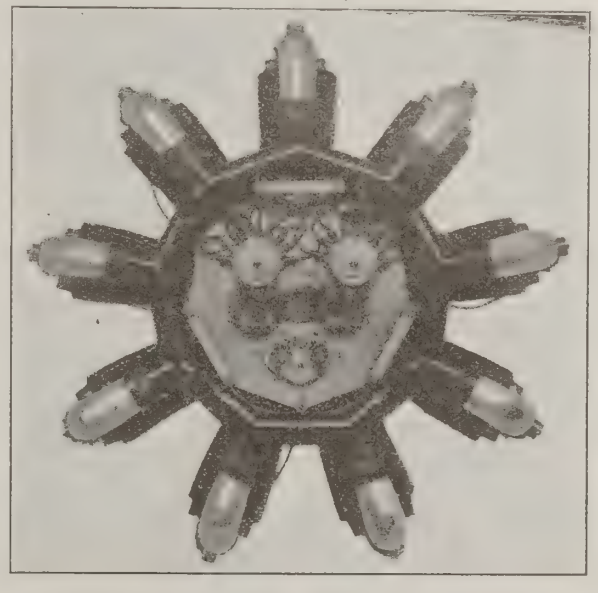


Fig. 4. Rear view of 350 H.P. "Dragon Fly"

this it is possible to say that each cylinder carries three valves in the head—two small valves for the exhaust, one large for the inlet—the exhaust valves communicating directly with the open air, no arrangements for exhaust manifolds being provided. Lubrication in the Wasp and the Dragon Fly is by forced feed through the hollow crankshaft to the crankpin, and thence by combined centrifugal force and splash. Circulation of the oil is maintained by a special type of rotary plunger pump, two pumps being used in the two larger models and one pump in the Gnat (in this model lubrication is by splash throughout). The construction of these engines will be rendered somewhat more clear by reference to the illustrations.

MAINTAINING CONSTANT PRESSURE BEFORE THE CARBURETORS OF AERO ENGINES REGARDLESS OF THE ALTITUDE

By LESLIE V. SPENCER, M.E.

Formerly Editor of Technical Publications, Experimental Department, Aeroplane Engineering Division, Bureau of Aircraft Production at the McCook Field, Dayton

AS mentioned in last week's general discussion of the problem of supercharging the aero engine so as to maintain a practically constant induction pressure regardless of the altitude, and therefore nearly uniform power output, the United States government soon after our entry into the war secured the services of Mr. E. H. Sherbondy and Dr. Sanford A. Moss to carry on independent investigations along this line, and to design super-compression machines which would be especially adapted to the Liberty twelve-cylinder engine.

It is doubtful if this line of experimental work would have been inaugurated so early in our aircraft experimental program if it had not been for the fact that the promising results which Prof. Rateau and other European experimenters had secured during the two or three years previous had not been followed closely by our National Advisory Committee for Aeronautics and by the government engineers.

Having at hand the results of previous experimentation abroad, neither Sherbondy nor Moss had to strike out blindly, but in the main concentrated upon ways and means of developing thoroughly practical

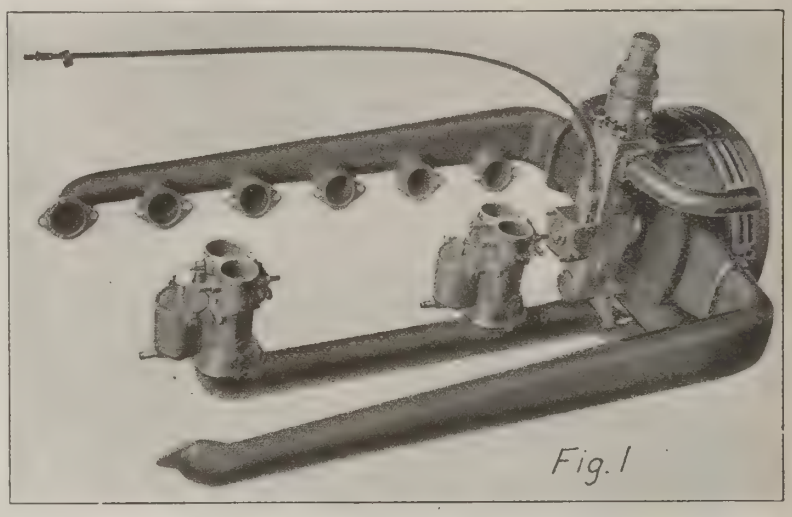


Fig. 1

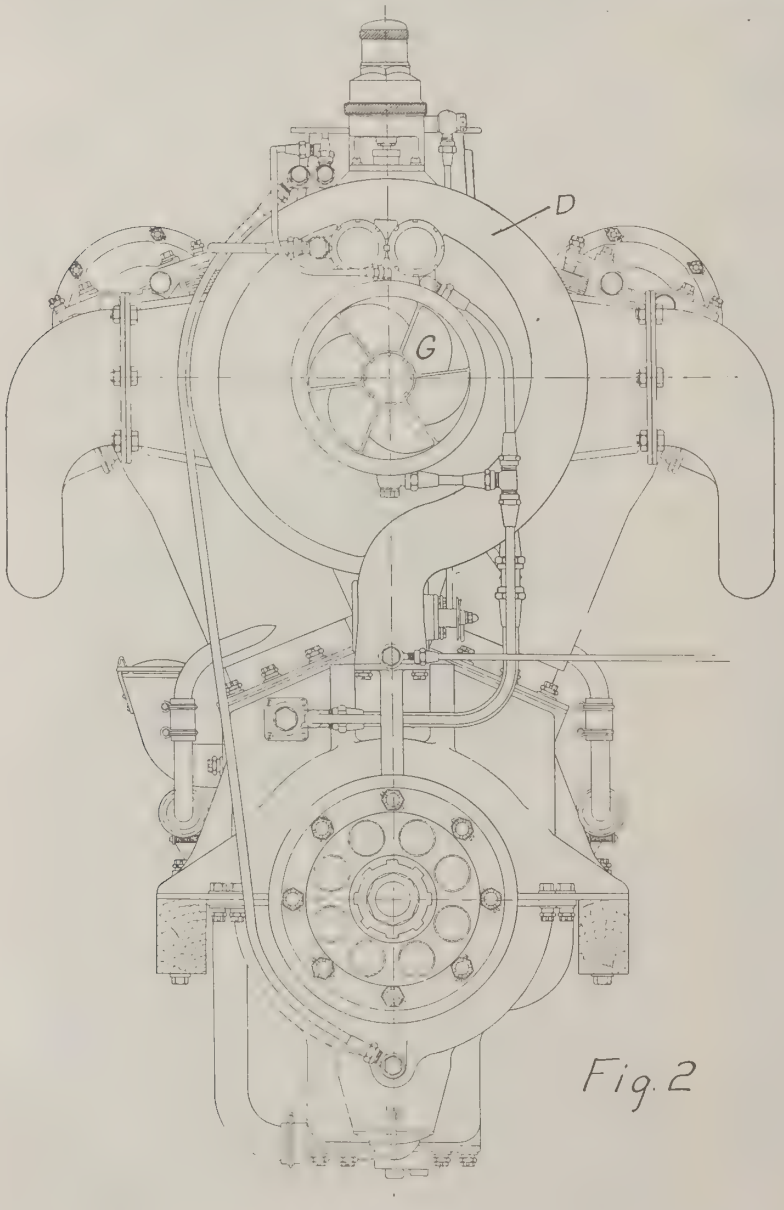


Fig. 2

machines or systems based primarily on the scheme of supercharging originated by Prof. Rateau, that is, a system in which the power for driving the compressor is furnished by an exhaust-gas-driven turbine. Moss clung strictly to the one line of action, whereas Sherbondy studied the problem also from the angle of driving the compressor by a shaft from the engine through the intermediary of a set of gears which served to step up the speed to that required for the operation of the compressor impeller. Thus he not only designed several supercharging apparatuses utilizing the Rateau principle, but he also laid out geared designs. Only the former were built, however, as Sherbondy soon became convinced that the utilization of the exhaust gas energy for driving the impeller was to be preferred, for reasons which have already been pointed out.

Although neither Sherbondy's nor Moss's machine was ready for actual flight tests at the time the armistice surprised the world, the work had so far progressed that it remained only to alter certain of the mechanical details so as to overcome weaknesses which the extensive ground tests had brought to light, when either machine would undoubtedly have been ready for preliminary trial in the air. This is particularly true of the Moss supercharger, which has been subjected to gratifying altitude tests on a portable dynamometer at the summit of Pike's Peak—a little over 14,000 feet above sea level.

If the work of European experimenters had not already convinced the aeroplane engineering world that there is great advantage to be gained by maintaining a constant pressure before the carburetor regardless of the altitude—within limits, of course—these altitude tests of the Moss device would have proved it. The advantages being already fully appreciated, due to the earlier tests in England, France and Italy, the results obtained with the Moss apparatus served to further strengthen the validity of the theories back of the idea.

The Sherbondy Superchargers

Fig. 1 gives a very clear idea of the general arrangement of the apparatus of the Sherbondy turbo-compressors as laid out for the Liberty twelve-cylinder engine. The two carburetors are carried on the one induction pipe, which has air-tight joints to the carburetor air intakes and also to the compressor discharge. The specially-designed exhaust manifolds which lead the exhaust gases to the turbine are also illustrated clearly. The compactness of the turbine and compressor unit proper is seen, this main part being designed to attach to the front of the engine without interfering with the normal position of the propeller. Installation of the turbo-compressor here

means that the radiator must be put elsewhere than at the front, most probably in the wings.

At the rear of the turbine housing is the automatic control mechanism, which serves to maintain the turbine speed at the right value to supply the correct supercharge under any atmospheric conditions up to the limit of about 20,000 feet, which is the maximum height for which the Sherbondy machine is intended to be effective.

As already explained, the turbine rotor and the air impeller

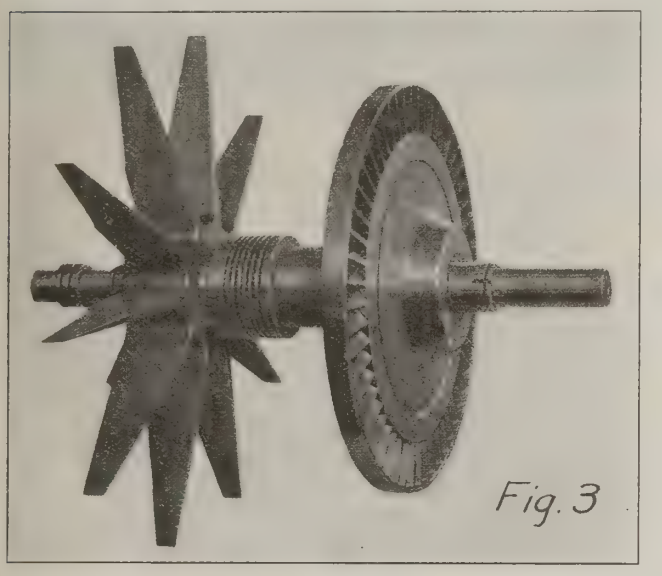


Fig. 3

are direct-connected on the same shaft, a labyrinth arrangement being constructed on the shaft between the two rotating members to prevent pressure leakage between the compressor chamber and the turbine. The rotating part of the device is shown in Fig. 3.

Fig. 4 is a sectional drawing of Mr. Sherbondy's last supercharger, in which a number of minor changes were made over the two previous designs in order principally to overcome the troubles due to the warping of the thin-gage parts of the two earlier constructions. The impeller A is inclosed in an aluminum housing H, which, throughout the length of the impeller blades follows the same taper, and is carefully machined inside to maintain a constant clearance between blades and housing of only twenty-five thousandths of an inch. The housing has the same taper as the blades out to a diameter a little larger than that of the impeller, where its sides become parallel for about another inch. This space acts as a diffusion chamber, after which the housing opens into an outer chamber C of circular section. This outer chamber is of constantly increasing diameter, tapering from an area of almost nothing until it finally reaches the area of the induction pipe. This may perhaps be better understood by referring to the front elevation drawing in Fig. 2 which shows the outer chamber D very clearly. The point of juncture with the induction pipe is shown at J in Fig. 4.

The impeller has ten blades and is 9 inches in diameter. The blades are tapered from a point a little over half way out on the air intake side, and converge to a relatively narrow tip width, as seen in the drawing The entering edge of the blades is rounded off to prevent air shocks.

A most interesting feature is the turbine rotor, which in the latest Sherbondy design is fitted with seventy-two buckets cut by a special process to the greatest accuracy. As will be readily appreciated, the buckets all had to be of exactly the same weight so as to prevent unbalance of the rotor—a condition which would be very serious at the high speeds which the device is designed to attain. These buckets are assembled into sockets accurately machined in the periphery of the rotor proper, and expansion under the heat of operation serves to hold them in place most securely.

Much research and experimentation was carried on by Mr. Sherbondy before he was able to fix upon an alloy which would be sufficiently strong and of a high enough heat-resistant quality to withstand the very high temperatures and stresses encountered in operation of the device.

The turbine rotor was designed for an angular velocity of 780 feet per second, which means a rotative speed of 31,050 revolutions per minute. The turbine nozzle angle is 21° 45′, and that of the buckets, 35° 15′, with a gas velocity at entrance designed to be about 1950 feet per second, and that at exit from the buckets, 750 feet per second. This is a ratio of a little over 2.5 to 1.

In designing the air inlet, it was desired to prevent all air shock so far as possible, and therefore the conical air inlet G, Figs. 2 and 4, was provided with radial guide vanes which impart a certain velocity to the air and give it direction also before it comes in contact with the rapidly-rotating impeller blades.

The designing of the bearings was also a tough problem, for they must withstand a variety of severe conditions in service, especially when the device is operating at or near its maximum effective speed. Reference to L and L_1 in Fig. 4 will give an idea of the details of their construction. The rear bearing L_1 is subjected to most serious conditions in this design, in that it is in the path of the exhaust gases, whereas the front bearing L is in the center of the air inlet part and is under no severe heat conditions. Both bearings are constructed with spherical seats, which allow them to compensate automatically for any misalignment of the assembly, a possibility should the castings warp to any extent under the high temperatures. They are in effect small self-aligning bearings. The bearing proper between shaft and housing is of plain babbitt. At the front there is, in addition to the bearing just mentioned, a marine type thrust bearing which holds the rotating member against end thrust caused by the pressure of the gages going through the nozzles against the buckets of the rotor.

Pressure feed is used for efficient lubrication of both bearings, which are provided with an excess over actual requirements for obvious reasons. This oil is intended to be forced

(*Continued on page* 356)

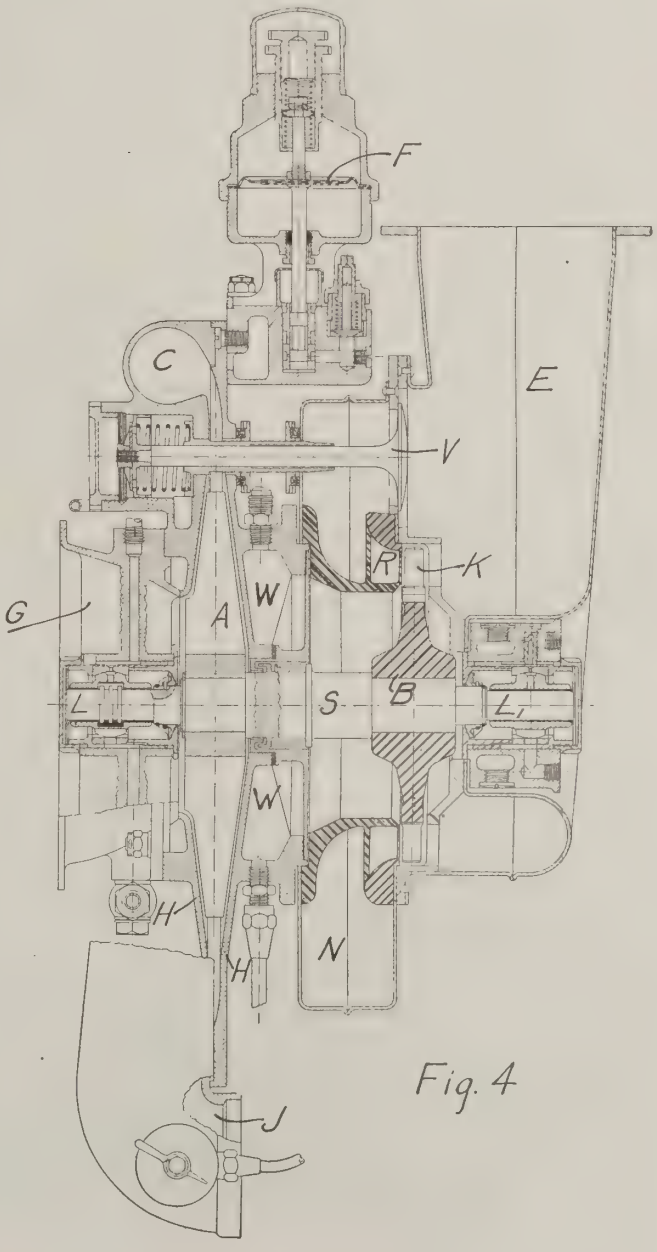


Fig. 4



THE NAVY HS-1L AND 2L FLYING BOATS

FOR coastal patrol duties, the HS-1L and 2L Flying Boats were put in quantity production by the United States Navy Department. Both types are equipped with a single Liberty engine; the HS-2L is 12 feet greater in span than the 1L, but otherwise the machines are similar.

Data and drawing of the HS-1L as built by the Standard Aero Corporation applies to the other machine, with the exceptions noted. At the end of this description data is given relating to the HS-2L, supplied by the Curtiss Aeroplane and Motor Corporation.

THE HS-1L

General Dimensions

	(*Feet*)
Span, upper plane	62.05
Span, lower plane	52.14
Chord, both planes	6.01
Gap (front)	7.51
Gap (rear)	7.49
Length overall	38.50
Height overall	14.61

Areas

	(*Sq. Ft.*)
Upper panel, without engine section or ailerons	232.00
Engine panel section, upper	75.80
Lower outer panel, without ailerons	184.00
Lower inner panel	53.20
Upper ailerons (each 30.80)	61.60
Lower ailerons (each 21.30)	42.60
Sidewalk section	3.80
Total supporting surface	653.00
Horizontal stabilizer	54.80
Elevators (each 22.80)	45.60
Vertical stabilizer	19.60
Rudder	19.60
Nonskid plane	16.00

Weights

Hull

	(*Pounds*)
Hull (including soakage)	1,265

Wings, Tail, Etc.

Upper panels	284
Lower panels	184
Engine section	106
Sidewalks	72
Ailerons upper braces, etc	75
Ailerons lower braces, etc	40.5
Aileron connecting rods	15
Rudder, etc	24
Elevator, control, etc	33
Vertical stabilizer	22
Horizontal stabilizer	49
Stabilizer braces	26
Outrigger	17
Wing-post struts	111
Engine-bed wires, etc	184
Bowpost, oil piping	29
Pontoons	58.5
Nonskid planes	16
Engine section cables	37
Sidewalk wire, etc	13
Tail skid	4
Total	1,400

Ordnance Equipment

1 Lewis gun	19
1 shell deflector	3
2 ammunition trays	20
1 mount	25
1 Colt, 1 Very pistol, rockets, etc.	22.5
1 Wimperis course-setting bomb sight	5.8
1 pilot directing bomb sight	26.7
2 bombs with gear	378
Installation of above	60
Total	560

Engines and Equipment

Engine	806
Water	114.5
Radiator	83
Propeller	70
Fan gasoline pump	18
Hand pump	5
Tanks	120
Gravity tank	31
Oil tank	18
Spark and throttle	2
Wire mesh	8
Tachometer	11
Oil pressure gauge	1
Thermometer	1
Gasoline sight	1
Tools and spare parts	15
Oil Thermometer	1
Radiator support	5
Hand crank	13.5
Exhaust	12
Total	1,336

Electrical Equipment

Storage battery	15
Aldis signal lamp, running lights, instrument lights	9
Switchboard	3
Wiring for electrical instruments	10
Intercommunication set	10
Installation of above	6
Total	53

Accessories

Bilge pump	10
Sea anchor	15
Air-speed meter	5
Inclinometer	1.3
Fire extinguishers (2)	14
Installation of above	6.7
Total	52

Navigation Equipment

Compass	4
Watch	1
Altimeter	2
Chart Board	3
Flags	2
Food and water	10
Pigeons	5
Binoculars	2
Installation of above	3
Total	32

Personnel and Fuel

Crew (2 men, at 180 lbs.)	360
Gasoline (110 gallons) and oil (6 gallons)	730
Total	1,090

Miscellaneous

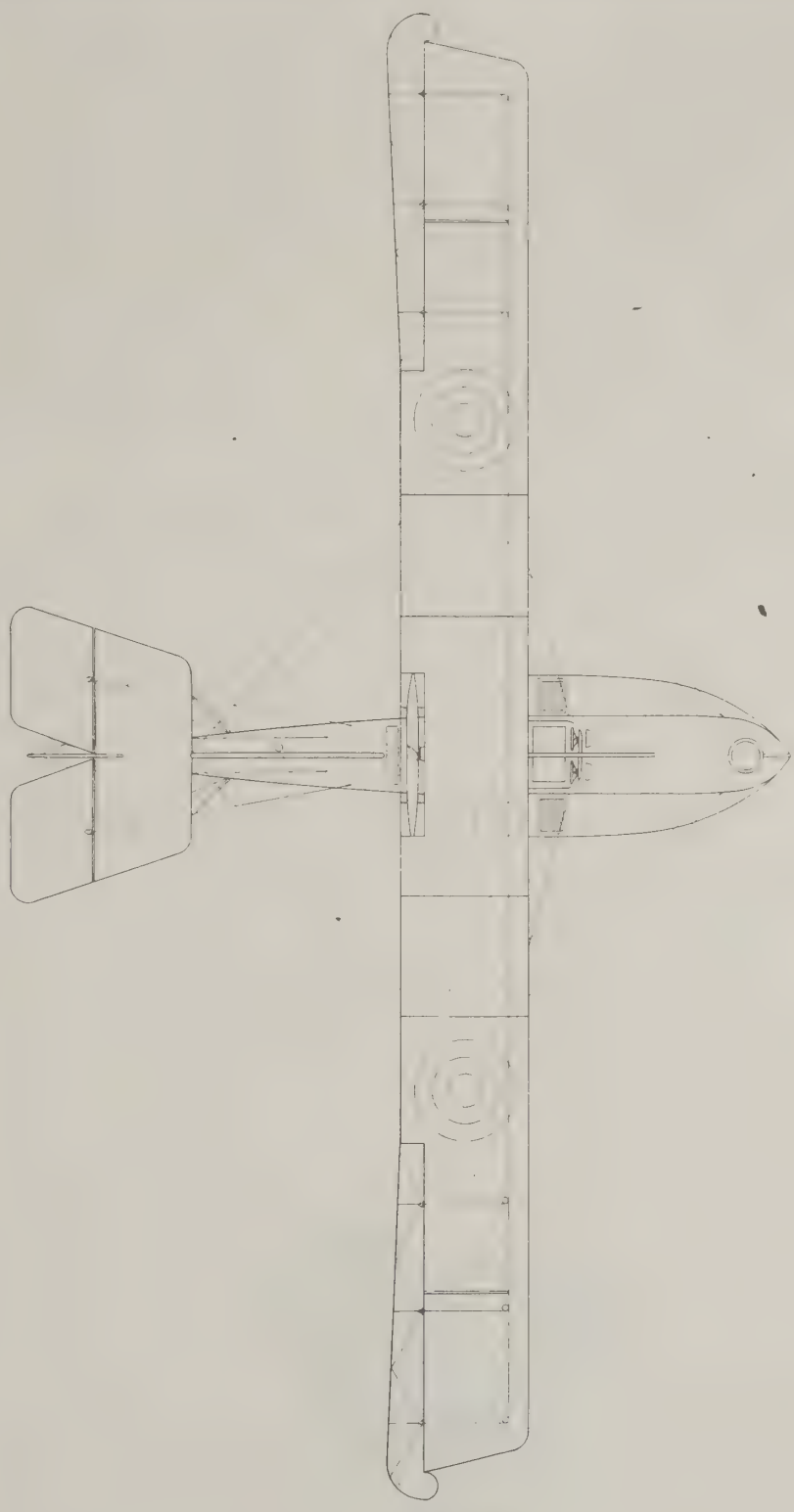
Medical emergency kit	2
Radio and installation	110
Total	112

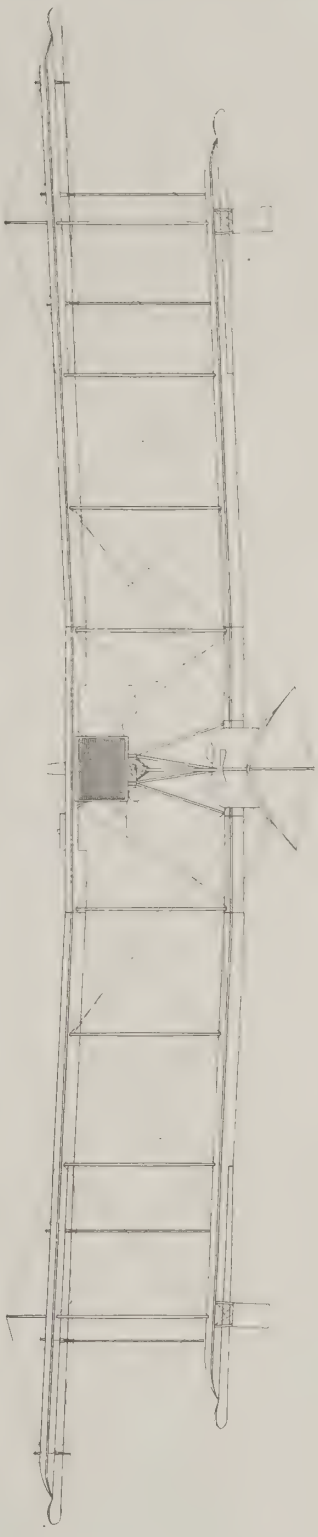
Summary

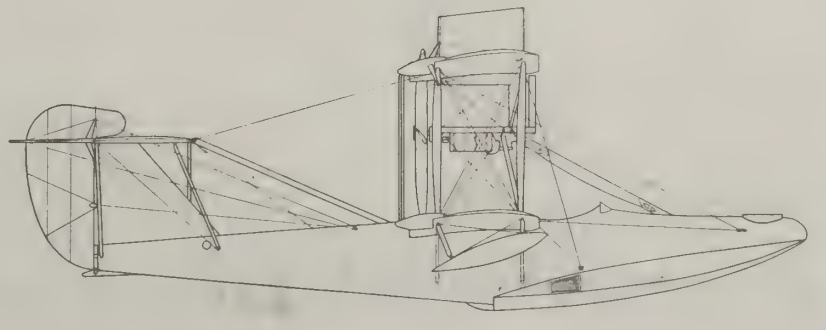
Hull (including soakage)	1,265
Wings, tail, etc	1,400
Ordnance Equipment	560
Engines and equipment	1,336
Electrical equipment	53
Accessories	52
Navigation equipment	32



One of the Curtiss HS-2L Flying Boats at the Rockaway Point Naval Air Station







NAVY TYPE HS 2L
330 HP LIBERTY
FLYING BOAT

Scale of feet

2 4 6 8 10 12 14

McLaughlin

	(*Pounds*)
Personnel and fuel	1,090
Miscellaneous	112
Total	5,900

Performances

Maximum speed (horizontal flight)	91 M.P.H.
Minimum speed (horizontal flight)	53 M.P.H.
Climb in 3 minutes	500 feet
Weight per horsepower	17.9 lbs.
Weight per square foot	9.03 lbs.

Main Planes

Wing section, R. A. F. No. 6; aspect ratio of upper plane, 11; aspect ratio of lower plane, 10.

Planes have no stagger nor sweepback. Dihedral of outer panels, 2°. Decalage, 1.5°. Angle of lower wing chord to propeller axis, 5.5°.

Wing chord, 6′ 3 5/32″. Leading edge to center line front beam, 9″. Main beams centered 48″ apart. Center line rear beam to trailing edge, 18″.

Upper plane in three sections; lower plane in four sections (two each side of hull). Sidewalk sections integral with hull. Ailerons are balanced. Upper ailerons 2′ 2″ maximum width and 17′ 8½″ long. Lower ailerons 1′ 10″ maximum width, 12′ 9″ long.

All fabric sewed to panels, seams laid diagonally or normal to leading edge. Fabric finished with two coats of cellulose acetate; two to four coats of cellulose nitrate; two coats of anti-actinic gray wing enamel on top fabric surfaces and vertical fabric surfaces; one coat of anti-actinic gray wing enamel on bottom fabric surfaces.

Strut fittings are of steel stampings and forgings. Wing spars of spruce. Trailing edge of steel tube flattened to oval shape. Wing-post fittings enameled gray over copper plating. Intermediate ribs of lightened pine. Compression ribs of solid pine.

Hull

Overall length of hull, 34′ 5″; width, 4′ 0″ width over planing fins, 8′ 0″.

Pine or cedar is used for planking, 3/16″ for outer and 5/32″ for inner, with fabric between glued to planking. Planking on top and sides, 5″ wide, 5/32″ thick.

Frames, keel and sternpost are of ash. Keelson, deck stringers and floors are of pine or cedar. Chine stringers are of pine or Port Orford cedar. Seam strips of Spanish cedar. Bulkheads, 3-ply waterproof veneer. Engine beds of ash-spruce-ash.

The engine bracing system is composed of streamlined steel tubing, braced with non-flexible tension cables.

Hull is finished with low visibility gray wing enamel or navy gray pontoon enamel. All metal parts enameled.

Controls

Double wheel control. Control bridge is of the inverted "U" type, ash frame, equipped with two 4-spoke bronze spider, black walnut rim, 16″ hand control wheels.

Bronze sheaves for guiding cables. Elevator control lines attached to bridge by steel fittings. Bridge ends reinforced by lightened steel fittings.

Rudder foot-bars of ash, mounted on bronze blocks.

Throttle and spark advance control levers mounted in operator's cockpit located between the two seats on diagonal bridge. Cutout switch located within reach of pilot.

Bracing Cables

All cables galvanized, non-flexible. Front and rear engine section and intermediate cables are 3/16″; outer, 5/32″. Flying cables doubled. Stagger cables, single, ⅛″. Engine bed to top inner post, and also engine bed to hull sidewalk section, 3/16″. King post brace wires, ⅛″.

A change made in the sizes of some of the above cables was incorporated in all but a few of the boats, which had been shipped before the change was deemed advisable. In the front, the engine section and intermediate cables are now ¼″, outer, 3/16″ and overhang decreased to 7/64″. In the rear, the engine section cables are now increased to 7/32″ and the overhang decreased to 3/32″.

Power Plant

The power plant consists of a 12-cylinder, low-compression Navy type Liberty engine, developing 330 h.p. at 1700 r.p.m. Cylinders arranged at a 45° V. Bore, 5″; stroke, 7″.

Two Zenith duplex carburetors are used. For the ignition system, a storage battery and induction coil are provided, and a distributor on each cam shaft.

Fuel tanks at the center of gravity have a capacity of 110 gallons. Oil capacity, 6 gallons. Fuel consumption, .55 lbs. per horsepower per hour; oil, .03 lbs. per horsepower per hour.

The Curtis Co.'s specifications call for 3 main fuel tanks (at 41.6 gal. each) 124.8 gals. Gravity tank at 29 gals.

Total capacity 152.8 gals., weight 917.50 lbs. Oil, 13.34 gals., weight 93.38 lbs.

THE HS-2L FLYING BOAT

The HS-2L, which is a modification of the HS-1L, consists essentially in the addition to the wing surface and an increase in rudder area. The additional wing surface is obtained by adding four 6-foot panels, one on each side in both lower and upper planes adjacent to the outboard extension panels.

All the parts required to convert the HS-1L to the HS-2L are duplicates of other parts already on the HS-1L, excepting the four 6-foot panels and the larger rudder.

The wing beams in the upper engine section of the HS-2L are made without routing, and provision has been made to supply an upper engine section panel having unrouted beams with the other parts necessary to convert the HS-1L to the HS-2L.

The following represents the parts necessary to convert the HS-1L service machine into the HS2L:

(a) Upper engine section wing panel beams unrouted.

(b) Front engine section lift wires changed from two 3/16-inch to two ¼-inch non-flexible cable.

(c) Rear engine section lift wires changed from two 3/16-inch to two 7/32-inch non-flexible cable.

(d) Four 6-foot panels supplied complete with hinges and standard HS-1L wing-post fittings, including bolts, strut pins and cotters.

(e) Four front-lift and four rear-lift non-flexible cables supplied ¼ inch and 7/32 inch respectively. Also single drop wires front and rear of the same size. These are for the added panels on each side.

(f) Two front interplane struts 2⅝ by 6⅝ by 84 inches supplied.

(g) Two rear interplane struts 2 3/16 by 5½ by 84 inches supplied.

(h) Four ⅛-inch stagger wires with turnbuckles and end connections supplied.

(i) One rudder supplied having an area of 26 square feet instead of HS-1L rudder having an area of approximately 20 square feet.

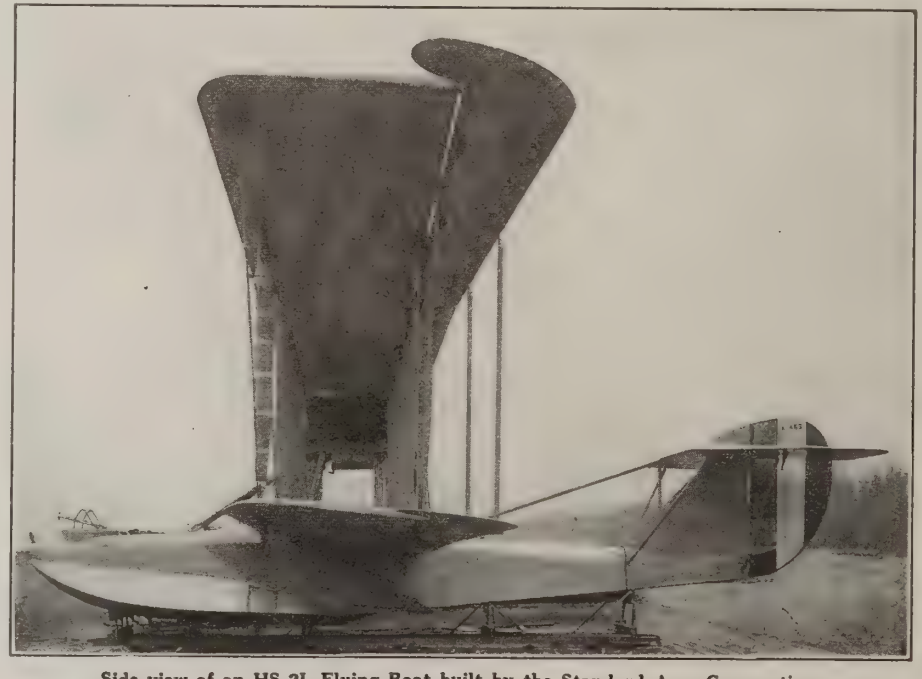
(j) Aileron control wires lengthened and changed to accommodate increased span.

The following general specifications of the HS-2L. Flying Boat, supplied by the Curtiss Company, show the differences in the two models:

General Dimensions

Span, upper plane	74′ 0 19/32″
Span, lower plane	64′ 1 21/32″
Chord, both planes	6′ 3 5/32″
Gap (front)	7′ 7 1/8″
Gap (rear)	7′ 5 29/32″
Length of machine overall	40′ 0″
Height of machine overall	14′ 7¼″
Angle of incidence, upper plane	5½ degrees
Angle of incidence, lower plane	4 degrees

(*Continued on page* 357)



Side view of an HS-2L Flying Boat built by the Standard Aero Corporation

SECOND PAN-AMERICAN AERONAUTIC CONVENTION AND EXHIBITION

To Be Held Under the Auspices of The Aero Club of America, The Aerial League of America and the Pan-American Aeronautic Federation.

From Thursday, May 1st, 1919,
to
June 1st, inclusive,
at
Atlantic City, N. J.

Intercollegiate Contests Throughout the Summer

CONTESTS TO BE HELD EACH SATURDAY

(1) Seaplane Contests (general),
(2) Curtiss Marine Flying Trophy and Prizes,
(3) Intercollegiate Seaplane Contests,
(4) Land Aeroplane Contests,
(5) Dirigible Contests,
(6) Kite Balloon Speed in Ascending and Descending, and Maneuvering Contests,
(7) Parachute Competition,
(8) Aviette (bicycles and motorcycles with wings) Contests.

EVERY DAY ACTIVITIES

(1) Exhibits of Aeroplanes, Motors and Accessories on the Steel Pier,
(2) Demonstrations and tests of Seaplanes, Land Aeroplanes, Motors, Dirigibles, Kite Balloons, to prospective purchasers and representatives of different governments,
(3) Aerial Passenger Carrying by seaplanes and dirigibles, and kite balloon ascensions,
(4) Moving pictures and Addresses by leading authorities on most important phases of aeronautics.
(5) Competition for the Pulitzer Trophy.
(6) Competition for the Atlanta Journal Trophy.
(7) Competition for the Curtiss Marine Flying Trophy.

The Governments and Aeronautic, Sporting, Scientific, Industrial and Civic organizations of the United States and all the countries in the world, excepting Germany and her allies, are invited to send representatives to attend this great aeronautic event. On arrival in the United States these representatives should call at the Headquarters of the Convention Committee at No. 297 Madison Avenue, New York City, to register and receive their official badges and the official program.

In the event that it is more convenient for them to go directly to Atlantic City they will register at the offices of the Convention located at the following Atlantic City hotels: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis and Hotel Haddon Hall.

Representatives of the Convention Committee will be at the Bureaus of the Aeronautic Convention at the above-named hotels and will issue the official badges which admit the bearer to the Aeronautic Hall, as well as the Aero Exhibition on the Steel Pier, the judges' enclosure during contests, and to the Aerodrome and seaplane stations where the aircraft and motors will be demonstrated.

All communications until May 1st should be addressed to Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

Entries for the contests should be addressed to the Contest Committee, Aero Club of America, 297 Madison Avenue, New York City.



DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

THURSDAY, MAY 1ST

Opening of Convention and Exhibit.

AFTERNOON—Reception at Aeronautic Hall on the Steel Pier. Addresses by United States Government State and aeronautic authorities.

EVENING—Aero Show and addresses by officials.

FRIDAY, MAY 2ND

AFTERNOON—Aero Show. Preliminary tests of seaplanes, dirigibles and kite balloons.

EVENING—Moving pictures and address on flying for sport and pleasure.

SATURDAY, MAY 3RD

AFTERNOON—Seaplane and dirigible races, and kite balloon ascending and descending contest.

EVENING—Ball.

SUNDAY, MAY 4TH

MORNING—Memorial service by eminent Divine for the dead airmen.

AFTERNOON AND EVENING—Reception to allied aces and heroes of the air and their parents, and announcement of the award of the Aero Club of America Medal of Valor, and the Aerial League of America Diploma of Honor.

MONDAY, MAY 5TH

AFTERNOON—First parachute contest for $500 Bennett Prize.

EVENING—"The Large Dirigible and Its Value for Transportation." Representatives of railroads, express, steamship and other transportation organizations invited to attend.

TUESDAY, MAY 6TH

AFTERNOON—Illustrated addresses on "Aerial Forest Patrol." Forestry Department of every State invited.

EVENING—"Work of Aerial Police Squadrons, and Why Every City Should Have One."

WEDNESDAY, MAY 7TH

AFTERNOON AND EVENING—Aerial Mail Day. Illustrated address on, and consideration of, "Aerial Mail Planes." Chairman of Post Office and Post Roads Committees of House of Representatives and Senate, and Postmaster General Burleson invited to deliver addresses. (26,000 United States Postmasters, and Chambers of Commerce of 13,000 cities invited to attend.)

THURSDAY, MAY 8TH

AFTERNOON AND EVENING—Illustrated addresses on the "Need of Municipal Aerodromes, and the Part to be Played by Aircraft in City Planning." Chambers of Commerce and City Planning Commissions of 13,000 cities invited to attend.

FRIDAY, MAY 9TH

AFTERNOON—Arrival of seaplanes and army planes from Army and Navy Air Stations. Second parachute competition for the $500 Bennett Prize.

EVENING—Illustrated addresses on "Latest Developments in Aerial Warfare and Adventures in Aerial Warfare," told by famous aces.

SATURDAY, MAY 10TH

AFTERNOON—Army, Navy and Marine Corps Day. Aerial contests and tournament.

EVENING—United States Army and Navy Officers' Reception. Reception and addresses at Aeronautic Exhibition Hall on the Steel Pier.

SUNDAY, MAY 11TH

AFTERNOON AND EVENING—Presentation of the flags by each State of the United States to the Aero Squadrons representing the States. Each State will present a flag to each Aero Squadron, the members of which were overwhelmingly natives of that State. The presentation will be made by representatives from the State and the Aero Club and Aerial League branch of that State. All States and cities invited to send delegates, and Army, Navy and Marine Corps to send representatives.

MONDAY, MAY 12TH

AFTERNOON—Demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night." All national advertisers and advertising agents invited to attend.

EVENING—"Pan-American Aerial Transport Over Land." Addresses by members of the commissions of the 20 Latin-American Republics.

TUESDAY, MAY 13TH

AFTERNOON AND EVENING—"Pan-American Aerial Transport Over Water." Addresses by members of the 20 Latin-American Republics' Commissions.

WEDNESDAY AND THURSDAY, MAY 14TH AND 15TH

AFTERNOONS AND EVENINGS—"The Airways and Aerial Transport in Europe, Canada, Africa, Australia and Asia."

FRIDAY, MAY 16TH

AFTERNOON AND EVENING—"Aerial Navigation Instruments for Flying Over Land and Water." Aviators, navigators, scientific instrument makers and aeronautic experts invited.

SATURDAY, MAY 17TH

AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.

EVENING—Extensive exhibit of aerial photographs and photographic apparatus. All photographers, professional and amateur, and makers of photographic apparatus invited.

SUNDAY, MAY 18TH

AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH

AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."

EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH

AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST

AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.

EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22nd

AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Telegraphic and Climatic Factors in Relation to Aeronautics.

FRIDAY, MAY 23RD

AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulation of Air Traffic." (First day.) Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH

AFTERNOON—Races and contests.

EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH

AFTERNOON AND EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK.

MONDAY, MAY 26TH

AFTERNOON—"Aeronautic Engineering Problems and Their Prospective Solution."

EVENING—Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH

AFTERNOON—"Factors That Increase the Efficiency for Large Dirigibles."

EVENING—"Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH

AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."

EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH

AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."

EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)

AFTERNOON—Dirigible races, kite balloon speed ascending contest; parachute contest.

EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST

AFTERNOON—Seaplanes, land planes and dirigible contests. Aviette competition at which all cyclists and makers of bicycles and motorcycles will be invited.

EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST

AFTERNOON AND EVENING—Award of prizes and diplomas for all events.

Air Service Demobilization

Commercial Aerial Transportation Concerns will find it to their advantage to write to

The Aerial Register

(To appear shortly under the auspices of AERIAL AGE WEEKLY)

For NAMES and QUALIFICATIONS of

Pilots
Meteorologists
Aerial Navigators
Aerial Surveyors
Aerodrome Managers
Engine Specialists
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Aerial Traffic Managers
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Instructors
Airship Pilots
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And for INFORMATION CONCERNING COMMERCIAL AERONAUTICS IN ANY PART OF THE WORLD

If **YOU** hold any of the above qualifications, but have not yet registered, you are invited to communicate with the Editor (Air Service Demobilization Department) AT ONCE.

280 MADISON AVE., NEW YORK

AEROPLANE PROPELLER WASTAGE REDUCED

By ROLF THELEN

of the Forest Products Laboratory, United States Department of Agriculture

THROUGHOUT the war the development of the best practice in propeller manufacture, which is a highly specialized art requiring a thorough knowledge of wood technology and wood gluing as well as the greatest degree of skill in woodworking and gluing, has been the goal of constant co-operative effort by the Forest Products Laboratory of the Forest Service and the War and Navy Departments. As a result of this joint work, methods have been perfected which insure the production of the highest type of propeller, with the minimum wastage due to rejection on account of poor manufacture or improper handling before, during, or after manufacture. These methods have been adopted in the manufacture of American training and combat propellers, and have contributed their share to the well-known excellence of these propellers. In this connection it is interesting to note that, in the case of the Allies, it is reported that 80 per cent of the propellers received at the front were rejected on account of improper methods in handling and manufacture.

The regular researches of the Forest Products Laboratory on wood technology have been under way for many years. Its activities in connection with propeller investigations, which are in addition to these, may be grouped under four general heads, as follows: (1) Drying and storing of propeller stock; (2) Selection of laminations with proper regard for direction of grain, and density and moisture condition; (3) Glues and gluing; (4) Protection and storage of finished propellers.

Propeller lumber, as it comes from the sawmill, is usually 1 inch thick, 6 inches or more wide, and 8 feet or more long. This lumber is green when cut, and must be seasoned before it can be used in propeller manufacture.

While it is quite possible to air-season propeller lumber satisfactorily, the time required is excessive when war is in progress and speed is essential. Hence it became necessary to develop a method of artificial seasoning which would not injure the properties of the wood. The Forest Products Laboratory, which already possesed a great deal of experience in kiln-drying wood, attacked the specific problem of the proper artificial drying of propeller woods, and developed a method whereby the stock could be perfectly dried in a week or two. This method was adopted as standard by both Army and Navy and used for all propeller stock with the exception of certain relatively small amounts which had been cut before the declaration of war and which were available in the air-seasoned conditon. The Laboratory had already developed a dry-kiln in which this method of drying could be carried out, and a number of batteries of kilns of this type were built for drying aircraft lumber. Among these is the battery at Vancouver, Wash., one of the largest batteries of dry-kilns in the world. This battery was erected especially for drying spruce and Douglas fir aeroplane stock.

In developing this process, many experimental drying runs were made upon the various woods used for propellers, and the properties of the kiln-dried material were compared with those of similar material carefully air-dried. This comparison was reached through the medium of many thousand strength tests made both upon the kiln-dried material and upon that which had been air-dried. As a check, strength tests were also made upon green material. The conslusion drawn from this work is that properly kiln-dried material is appreciably better than the best air-dried stock. This had been forecast by the Laboratory's engineers, who based their judgment upon the fundamental principles involved.

After the stock has been dried, it must be stored under proper conditions of atmospheric temperature and humidity, in order that final adjustment of the moisture in the wood may take place, and that it may contain just the right degree of moisture when it is finally made up into propellers. This degree of moisture depends upon the atmospheric conditions of the locality where the propellers are to be used. Thus, training propellers for the southern fields required drier wood than was needed for battle propellers to be used on the battle lines in France. The Laboratory conducted researches to determine the relation between atmospheric conditions and the amount of moisture contained in the wood when exposed to these conditions, and it furnished the data upon which are based the specifications for atmospheric temperature and humidity in propeller factories and store-rooms.

Propellers are almost sure to swell and shrink during storage and use unless they are manufactured with the greatest possible care and specially treated to prevent changes in moisture when changes in atmospheric conditions take place. The problem of reducing this swelling and shrinking to a minimum and of leaving the remainder as uniform as possible received the most serious attention of the Laboratory. It was determined that the amount and character of swelling and shrinking was, in general, due to three factors, namely, grain, density, and moisture. The shrinkage and swelling of wood with changing moisture content is not uniform in all directions. The shrinkage lengthwise is practically negligible, while that measured in a direction corresponding to the circumference of the tree is about 1½ times that measured in a direction corresponding to the diameter of the tree. Shrinkage depends also upon the weight or density of the specimen, dense pieces having a greater shrinkage than light ones.

Shrinkage or swelling, when the wood changes from one moisture condition to another, varies with the amount of the change—the greater the change in moisture, the greater the change in the volume of the piece. Bearing these three points in mind, it is evident that, to obviate trouble from shrinkage and swelling in the finished propellers, all the laminations should be as nearly alike as possible in direction of grain (on the end faces), density, and moisture content. Further, proportion of the moisture should correspond, as nearly as possible, to that of the atmosphere in the locality where the propeller is to be used. These facts have all been taken advantage of in the manufacture of American propellers, and their application has done much to enable us to reach the present high standard in propeller construction.

All modern propellers, with one or two minor exceptions, are made by gluing together a number of boards or laminations which are usually from ½ to ⅞ of an inch thick. From five to nine laminations are ordinarily used in each propeller. In order to secure satisfactory service, it is essential that only the best grades of glue be used. When the United States entered the war, none of the government agencies had had enough experience with glues for a proper glue specification to be prepared or the necessary inspection work to be carried out. The Forest Products Laboratory immediately started the necessary investigations, and drafted a satisfactory propeller-glue specification under which practically all propeller glues for the Army and Navy have been purchased. It also developed methods of making tests and instructed Army inspectors in the proper inspection of glues. The great bulk of glue used in manufacturing propellers was inspected and certified by Army inspectors stationed at the Laboratory.

As has already been pointed out, propellers exposed to varying atmospheric conditions, even when varnished, will absorb or give off moisture, swelling or shrinking in the process. Unless the propellers are made with the greatest possible skill and care, the shrinking and swelling are apt to produce injurious warping and set up stresses which may cause the propeller to fail in service. The need for a coating practically impervious to the transmission of moisture was evident, and the Laboratory conducted several long series of experiments upon many types of coatings, including various shellacs, varnishes, enamels, electroplated metal coverings, vulcanite, and several kinds of metal-leaf coatings. A coating was finally devised, which was many times more effective than varnish coatings in preventing moisture transmission, and this coating has been approved for use by the Army. This coating consists of a layer of very thin aluminum leaf laid on over a layer of partially dry varnish, and then protected with several layers of enamel and varnish. While the coating has no greater resistance to wear than that offered by the varnish and enamel coats over the leaf, it does insure perfect protection to the propeller during storage and shipment, and in service until sand or spray wears it off. Since the greater portion of the existence of the average propeller is passed either in storage or shipment, the usefulness of the coating is apparent.

There are many phases of propeller manufacture which warrant further investigation, and the Laboratory now has under way a comprehensive study of propeller construction. As part of this research, several hundred propellers of various species have been made up under varying circumstances. These are being stored under controlled conditions of temperature and humidity in order that a study may be made of the exact effect of the manufacturing conditions upon the value of the finished propeller.

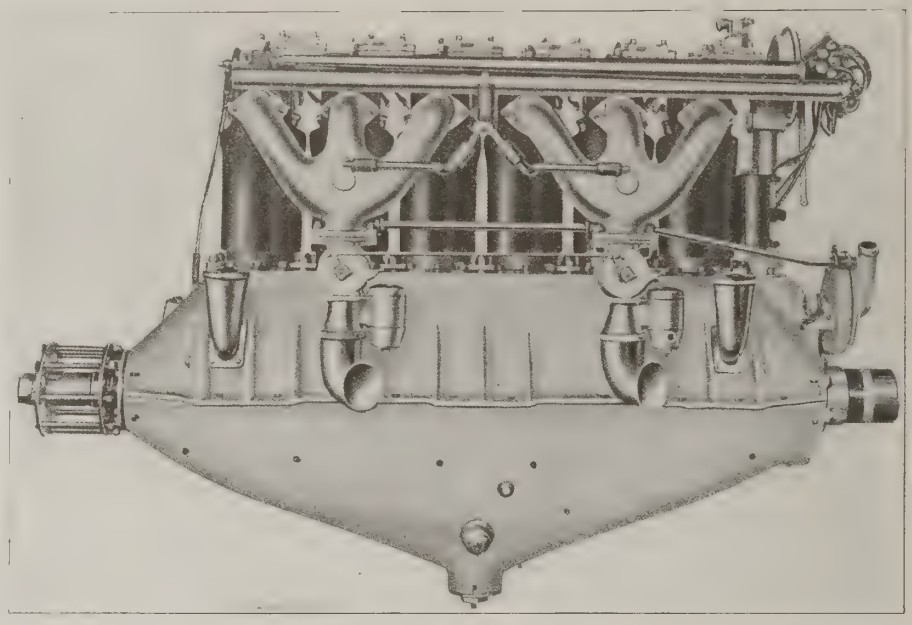
HALL-SCOTT TYPE L-6a AERO ENGINE

IN view of the rapid advances and improvements made in aircraft and power plant designs, the Hall-Scott Company, in keeping with recent development and progress have designed and perfected a new six-cylinder engine, which not only embodies all the superior qualities of the A-5 and A-5a Types, but also contain new and superior features.

The L-6a engine conforms in general appearance and design to the A-5 engine, as well as in general dimensions.

The general characteristics are as follows:

Number of Cylinders.....6
Bore 5-inch
Stroke 7-inch
Rated H.P. 200
Speed 1700
Propeller Dia.....9 feet
Pitch .....6 feet
Carburetor .....Miller
Normal B.H.P.....215
Method of Cooling—Water—Centrifugal Pump.
Ignition .....Delco
Piston Displacement—824.670 cu. in. 137.445 cu. in. per cylinder)
Piston Speed at Normal R.P.M. (1700)—1983 feet per minute
Compression Volume.....24.74 cu. in.
Compression Ratio.....6.555
Weight of Engine dry, including Carburetor and Ignition System—495 pounds
Weight dry, per Normal B.H.P.—2.30 pounds
Weight Temperature Inlet—150 degrees Fehrenheit
Water Temperature Outlet—165 degrees Fehrenheit
Water Circulation.18.5 gallons per minute



The Hall-Scott Type L-6a Aero Engine

The L-6a engine is of the vertical type with overhead cam shaft.

The cylinders are machined from steel forgings with steel jackets welded on similar to those used on the Liberty 12 engine.

The cooling system is of the circulating pump design and is very simple and efficient. Welded steel manifolds are used exclusively, obviating the necessity of any flexible pipes or tubing which is more or less liable to breakage. The connections are made with specially constructed rubber hose connections held on with clamps, permitting the easy removal of parts.

The connecting rods are of the I beam or H section, similar to all Hall-Scott rods, except that at the crank pin end the cap is bolted on with four bolts, instead of two, as heretofore used.

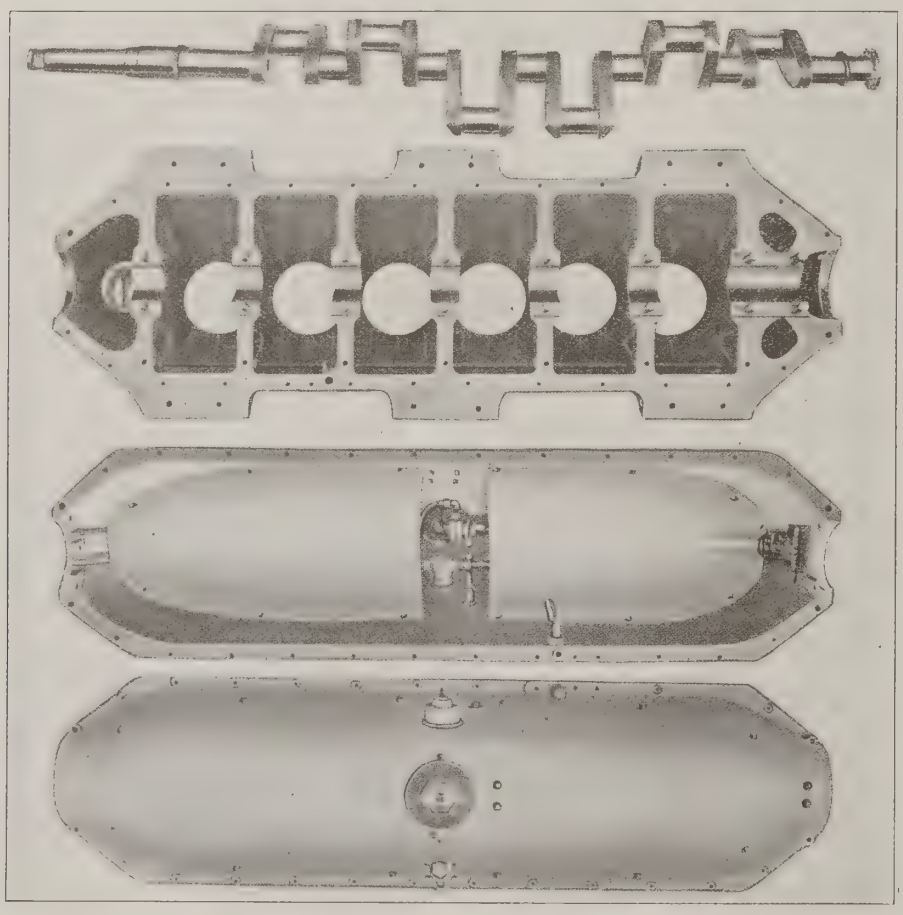
The crank shaft is the same as the A-5a type, with the exception of the cheeks, which are designed to withstand the extra stresses, resulting from a higher powered engine.

The propeller end of shaft is designed so the crank shaft flange can be removed with the propeller, permitting a quick installation of a new propeller if necessary. The crank is of the seven-bearing type with ball-thrust bearings at the propeller end.

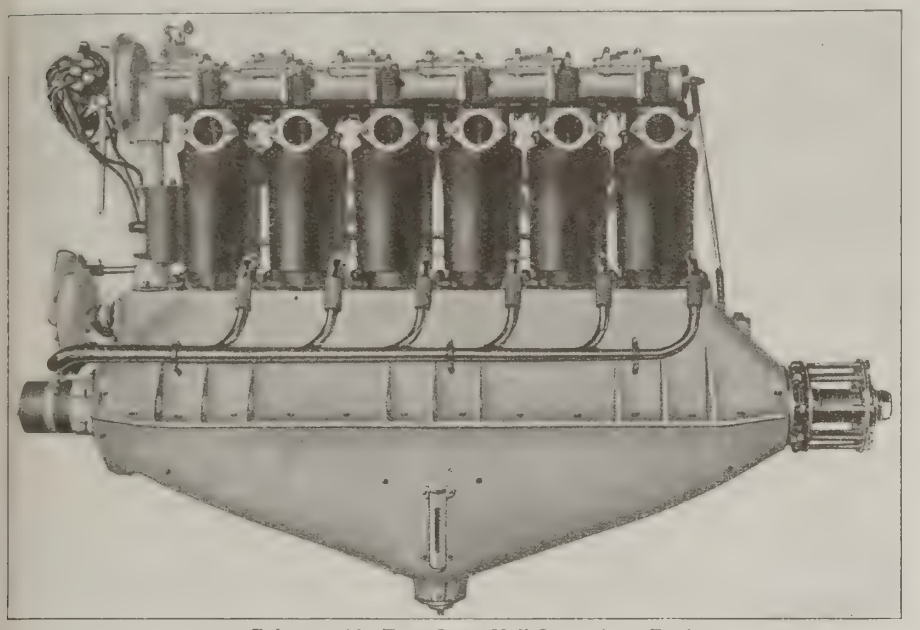
The cam shaft is of the one-piece type, cams and flange being integral, machined from a drop forging. The cam shaft is contained in an oil-proof housing, mounted on the cylinders, and is driven through bevel gears on a vertical shaft. The cam shaft and vertical shaft and all working parts are oiled under pressure from main bearing in the crank case. Surplus oil is returned to oil sump through the vertical shaft housing.

The crank cases are of aluminum. The lower case or oil sump can be removed without breaking any pipe connections. In the lower case are located the oil strainer and dirt trap oilsight gauge and a twin oil pump; one pump circulates oil through the engine from oil held in the sump, the other acting as a supply pump to oil sump, pumping oil into it from an external oil tank in a regulated quantity.

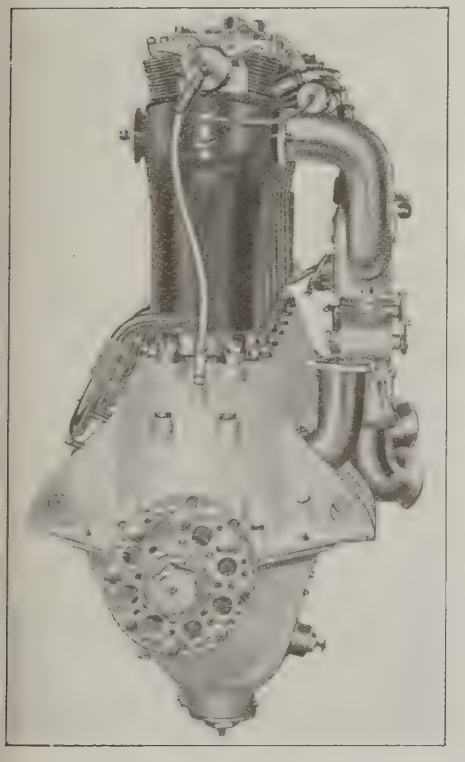
In the lower oil sump is a very sensitive and rugged oil relief valve, which can be adjusted externally so the oil pressure can be regulated to any pressure



Crankshaft; upper crank case, illustrating the seven main bearings with bolts; inside view of lower crank case, showing splash pan, oil pump, strainer and pressure relief valve; and outside view of lower crank case



Exhaust side Type L-6a Hall-Scott Aero Engine



Propeller end, Hall-Scott Engine

from zero to thirty-five pounds. Splash plates are also put in the lower case to prevent excessive splash from the dipper action of the connecting rods and crank.

Carburetion is secured through two specially designed carburetors and twin manifolds, which are of the hot-spot water-jacketed design. The carburetors are inter-connected through the controls.

The ignition is secured through a specially designed Delco Unit. The twin distributors are mounted on the end of the cam shaft housing and driven off the cam shaft. The coils are mounted directly underneath the distributors on the vertical shaft housing. The generator is driven off the end of the crank shaft and is bolted to the crank cases.

The oiling system is of the force feed or pressure type, oil being pumped to main bearings from which it is conducted through annular and radial drilled holes in crank shaft to connecting rod bearings.

The upper end of connecting rod and the pistons are oiled from splash and crank case fog. Large oil fillers are located on the intake side of the crank case, which also act as breathers.

The main bearing caps are bedded into the upper crank case and are bolted through the case by through bolts, which on the upper end act as cylinder hold-down bolts. Bronze-backed bushings are used in both the case and caps, shims being eliminated entirely with the exception of a few thousandths which permit the bedding of the crank shaft.

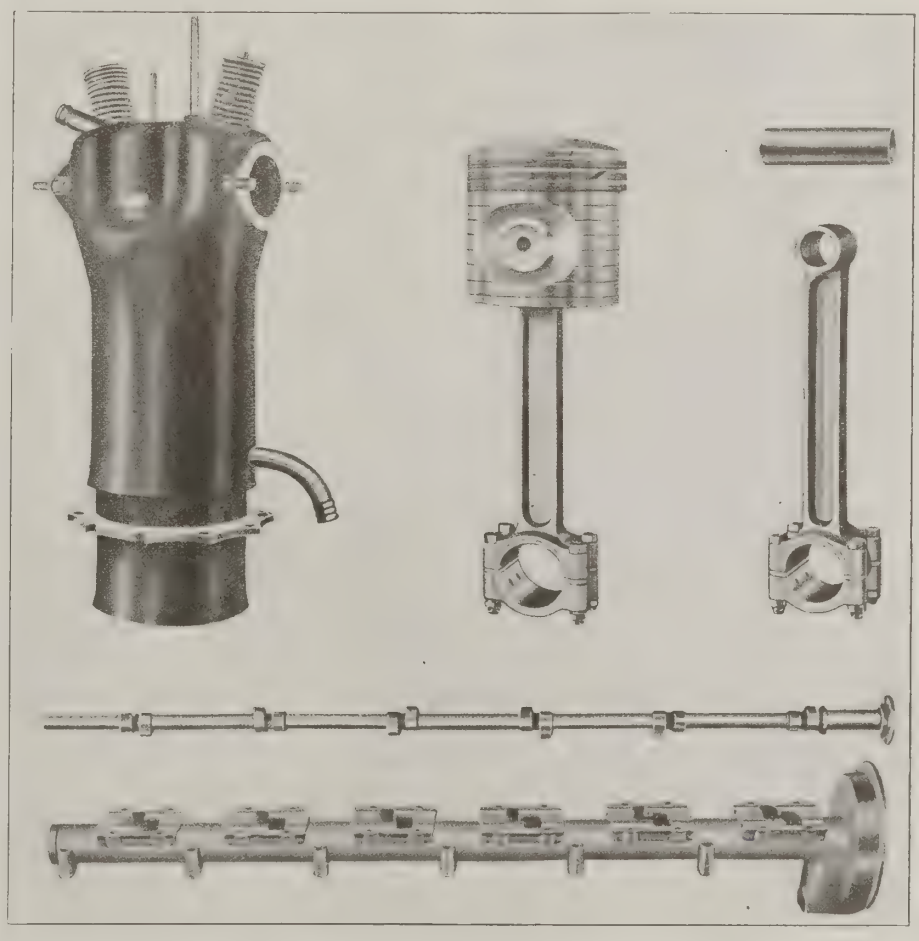
The valves are extremely large and located in the cylinder head, actuated through a rocker arm and tappet action. Double coil springs are used on both the intake and exhaust valves for the return action.

The pistons are of the design perfected by the Hall-Scott Company, and are of aluminum alloy, extremely simple in design and remarkably efficient. No clamping devices or set screws are used to hold the piston pin, which is permitted to float in both the rod and pistons.

Increasing Climbing Rate By Greater Friction on Lower Side of Fabric

Writing in the Zeitschrift für Flugtechnik und Motor-Luftschiffahrt, H. von Burberg states that when the wings of an aeroplane are being covered the fabric on the lower surface is sprinkled lightly with sand. Although the friction is thereby increased, the climbing power is considerably improved. This result is associated with the production of innumerable small eddies all in close proximity to each other on the undersurface of the wing, forming a species of air cushion. A fact closely associated with this is the phenomenon that when a machine flies directly into a head wind it climbs better than when flying in still air with the same relative speed. The author considers that this effect is directly connected with the eddying air encountered by the machine.

Experiments are being conducted to test the effects of roughening different parts of the surface of propellers and streamline bodies, and these have so far given satisfactory results. They have shown that roughening the under-surface of the wing is favorable to the production of a cushion of supporting eddies.



Assembly of details of the Hall-Scott Type L-6a engine

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Olcott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

NOTES

Note 1—Report to places mentioned in the order named.

Note 2—Report to Hoboken, N. J., to commanding general, port of embarkation.

Note 3—Report to Director of Air Service, Washington, D. C.

Note 4—Report to Cooperstown, N. Y., to United States Army Hospital.

Note 5—Report to Camp Grant, Ill., to the commanding general for assignment to duty.

Note 6—Report to Fort Porter, N. Y., to commanding officer for assignment to duty.

Note 7—Report to Newport News, Va.

Note 8—Report to U. S. Army General Hospital No. 10, Parker Hill, Boston, Mass.

Note 9—Report to Engineering Division, Air Service, Dayton, Ohio.

Note 10—Report to Emerson Field, Camp Jackson, Columbia, S. C.

Note 11—Report to Camp Bragg, Pope Field, Fayetteville, N. C.

Note 12—Report to San Francisco, California, to General Superintendent of Army Transport Service for transportation to the Philippine Islands, and upon arrival at Manila will report to Philippine Department—he will apply to Chief of Transportation for accommodations.

Note 13—Report to Middletown, Pa.

Note 14—Report to U. S. Army General Hospital No. 8, Otisville, N. Y.

Note 15—Report to U. S. Army General Hospital No. 9, Lakewood, N. J.

Note 16—Report to 1550 Woodward Avenue, Detroit, Mich.

Special Orders Nos. 82-88 Inclusive

A
Akins, Charles....Note 7
Adams, James E....Note 3
Adams, Benjamin H....Note 4

B
Baker, H. S....Note 7
Blair, Edward....Note 2
Byrd, Emmett Earl....LHV
Brown, William C. F....DAP
Bigelow, Harris S....Note 11
Bergen, Francis L....Note 14
Burgess, George H....Note 3
Brode, Clifton A....Note 13
Butler, Thomas P....Note 9
Bartels, Edward F....Note 9
Baker, William D....Note 6
Brown, William L....Note 5

C
Cook, Roy E....Note 9
Christensen, Jens T....Note 7
Cummings, Charles M....Note 7
Catlett, Landen C., Jr....Note 7
Cross, Harry E....Note 9

D
Dight, F. B....Note 7
Doherty, James F....Note 12
Doyle, Horace M....WFO
Dorland, Chester P....PFO
Doust, Horace Tyner....CAF
Dickens, George R....Note 7

E
Ehlers, George W....Note 7
Eding, Gerrard J....Note 3

F
Folker, Arnold F....Note 7
Forsyth, Ralph E....Note 7
Fluegel, Herman....LDT

G
Gilbert, Arthur C....Note 7
Gibson, Norman W....Note 10

H
Hepinstall, L. D....Note 7
Heitz, F. F....Note 7
Hendricks, Adolph....Note 2
Harrington, H. G....Note 7
Hogan, W. C....Note 2

K
Kingsbury, Orrin D....Note 3
Kampmann, John V....Note 5
Kellegrew, Edward W....Note 2
Kirkham, James E....Note 7

M
MacIntyre, Duncan L....Note 8
Mayer, Dudley B....Note 4
Mohr, James H....Note 7
Meyler, George A....Note 7
MacLeod, Norman L....Note 9
McCarty, Eugene R....Note 9
Merritt, Harold D....Note 2
Morrow, Joseph C....Note 4
Moore, Ralph J....Note 3
McLaurin, King H....Note 9
McPherson, A. J....Note 2
Markle, Alvan, Jr....Note 9

N
Neely, J. A....Note 7

P
Pyatt, K. R....Note 7
Pye, Harvey N....EOT
Propst, Rudolph W....Note 3
Piercy, James M....Note 6

R
Rorick, Estell H....Note 2
Rogers, J. B....Note 7
Reid, Charles A....Note 16

S
Stinson, David R....LHV
Sundeen, Martin A....Note 7
Schauweker, A. A....Note 7
Stone, V. D....Note 7
Scoby, R. B....Note 7
Scott, William, Jr....Note 7
Stewart, Guy....Note 2
Snedisor, Howard T....Note 2
Sprague, Clare W....Note 2
Shangraw, Clayton C....Note 3
Selff, Robert E....LHV

T
Tyree, John W....Note 7
Tubb, Talmadge B....Note 2

U
Ulrich, C. W....Note 7

W
Wood, Roland G....Note 6
Wilds, William....Note 5

Y
Yates, F. R....Note 7

Latest Naval Orders

Lieutenant (junior grade) Norman J. Learned, to duty naval air station, Cape May, N. J.

Lieutenant (junior grade) Homer R. Geedes to duty naval aviation detachment, Akron, Ohio.

Air Service Officers Honorably Discharged

The following officers are honorably discharged from the Service of the United States: Second Lieut. Howard W. Heintz, Captain A. S. Leon Richardson, First Lieut. George Perkins, First Lieut. William H. Vollmer, First Lieut Charles H. Shook, Second Lieut. Clarence A. Smith, First Lieut David S. Johnson, First Lieut. Frank A. Pence, Second Lieut. Benjamin F. Fiery, First Lieut. Elias H. Kron, First Lieut. Edward D. Babcock, First Lieut. Emil F. Schwab, First Lieut. Percy H. Willis.

Aero Squadrons Assigned to Early Convoy

Washington, D. C.—The War Department announces that the following organizations have been assigned to early convoy: 50th Aero Squadron; 637th Aero Squadron; 650th Aero Squadron; 660th Aero Squadron; 1108th Aero Squadron.

The 351st Aero Squadron is en route to the United States.

Air Service Demobilization

Progress in Demobilization

According to reports received from the Air Service, the net decrease in the total commissioned and enlisted strength from the date of the armistice to April 3 was 69 per cent.

The following table shows the distribution and per cent of net decrease to April 3. The strength figures include only officers and men not yet ordered discharged; they do not include men at demobilization camps awaiting discharge.

	Nov. 11	*April* 3	*Per cent net decrease*
Cadets	5,775	763	87
Officers	20,586	3,237	84
Enlisted men	164,266	55,550	66
Total	190,627	59,550	69

Demobilization of Air Service Personnel Overseas

During the week ending April 3, 1919, the Air Service personnel overseas decreased 193 men as against a weekly average of 2,780 during the seven preceding weeks. The strength of the Air Service in the United and overseas is shown for various dates in the following table:

	U. S.	*Overseas*
Nov. 11	111,846	78,786
Dec. 2	115,216	78,061
Dec. 26	99,010	59,917
Jan. 30	46,919	57,527
Feb. 27	33,649	53,087
Mar. 28	25,347	41,800
April 3	17,943	41,607

Colonel Kenly Honored By King George

Washington, D. C.—Colonel William L. Kenly, until recently Director of Military Aeronautics, has been conferred the honor of Companion of the Order of the Bath by King George of England. This tribute is the result of Colonel Kenly's brilliant work as Director of Military Aeronautics and, prior to that, as officer in charge of all flying at the battlefront. Colonel Kenly was recently reduced to his present rank in connection with the demobilization of the Army and has not so far been awarded any decorations from the American Government.

Army Expenditures Reducing

Washington, D. C.—According to an official statement prepared by the Statistics Branch of the General Staff, March is the first month to show a decided decrease in Army expenditures, with 58 per cent of the previous monthly average. In comparison, February expenditures were 96 per cent of the average.

The Bureau of Aircraft Production withdrew $11,082,000 from the Treasury during March, and the Department of Military Aeronautics drew $2,518,000. These two combined form 4 per cent of the War Department's total March expenditures.

The average withdrawals between July 1, 1918, and January 31, 1919, were $18,000,000 and $5,230,000 for the Bureau of Aircraft Production and Department of Military Aeronautics, respectively, and these two formed 9 per cent of the total War Department expenses. The March withdrawals formed 62 per cent of the average withdrawals for the eight month period for the Bureau of Aircraft Production and 48 per cent for the Department of Military Aeronautics.

Congressional Medal of Honor Awarded to Frank Luke

The Congressional Medal of Honor, America's highest award for valor, has just been awarded to Lieut. Frank Luke, Jr., Air Service, of Phœnix, Arizona, America's second ace, who was killed in action September 29, 1918, after bringing down two enemy planes, three balloons and about a dozen German soldiers.

Frank Luke, Jr., a Second Lieutenant in the Air Service, operating as a pursuit pilot of the 27th Aero Squadron, had, according to all accounts, the most vividly brilliant and yet meteoric career of any fighting pilot in the Air Service of the Army.

Frank Luke is credited with having brought down 18 enemy planes in 17 days. He had previously been awarded the Distinguished Service Cross and later received a second citation entitling him to wear an additional bar.

Colonel Milling Decorated By King of Belgium

Colonel Thomas de W. Milling, Air Service, Military Aviator, has been advised through the Adjutant-General that King Albert of Belgium has bestowed upon him the Order de Leopold, with rank of "Officier." This honorary distinction was conferred upon Colonel Milling as a token of the esteem of the King and in recognition of the valuable services rendered the common cause. Col. Milling served under General Mitchell while he was commander of the Air Service, First Army, and succeeded him when he was promoted.

Air Service to Co-operate With Forestry Service

Major-General Charles T. Menoher, Director of Air Service, has advised the Forest Service of the Department of Agriculture that the Air Service will co-operate with the Forest Service in order to carry out certain experimental work desired by that bureau on fire patrol. Mr. Henry S. Graves, the Forester, has been advised that he should communicate with the commanding officers of Rockwell Field, San Diego; March Field, Riverside, and Army Balloon School near Los Angeles, California, who will co-operate with the Forester in order to carry out the experimental work which he desires done during the coming summer. It is possible later that further work may be carried out at Mather Field. Conferences between Air Service officers and representatives of the Forest Service have been held for the purpose of determining further co-operation between these two bureaus in assisting in fire patrol of National Parks.

Figures for Active, Obsolescent, and Obsolete Planes and Engine on Hand Announced

(Prepared by Statistics Branch, General Staff, War Department, April 12, 1919.)

The Air Service has divided all planes and engines into three classes—"Active," "Obsolescent," and "Obsolete." The following table shows the number of engines and planes on hand for each class, according to revised figures:

	New	Used, but in flying condition	Out of Comm'	Total	Per Cent		
					New	Useable	Not Useable
Active							
Service engines....	9,725	412	277	10,414	93	4	3
Service planes....	2,264	198	150	2,612	86	8	6
Training Engines	1,997	491	155	2,643	76	18	6
Training planes....	740	1,019	344	2,103	35	48	17
Obsolescent							
Training engines....	4,541	4,417	1,900	10,858	42	41	17
Training planes....	498	1,854	552	2,904	17	64	19
Obsolete							
Engines...	1,638	116	1,009	2,763	59	4	37
Planes....	1,037	68	913	2,018	51	4	45



After completing a tour of inspection of French and British Aviation Camps, a Japanese naval delegation, consisting of Rear-Admiral K. Yosheida, Lieut.-Commander S. Kono, T. Ohzoki and S. Shayashi, and Engineering Commander K. Vitajima. This photograph was taken on their visit to the Curtiss plant on Long Island, where they were accompanied by the Japanese Naval Attaché and several naval officers

FOREIGN NEWS

Plane Quells Riot in India

Simla, India, April 17.—Aeroplanes were used to-day in coping with the disorders that have broken out in the Punjab. A mob attacked a passenger train in this district and wrecked the railroad station at Gujranwala. Aeroplanes were sent from Lahore to machine gun fire from the air.

Aerial Survey Reveals Sahara Route

Some interesting information about the regions of the Wadi Saura, Tidikelt, and the Mid-Sahara was collected during a recent reconnaissance carried out by aeroplane and motor-car under the orders of General Nivelle.

The fact is firmly established that it is possible to begin an aerial and motor-car service between the southern posts of the Algerian Sahara and the coast, via Colom Bechar, Insalah and Tuggurt. This would create a basis of revictualment for penetration across the Sahara towards the Niger.

Fokker Building Improved Planes in Holland

Two army o..cers, Colonel Earl McFarland of the Ordnance Department and Major Robert March, Jr., have been ordered to report to the American Military Attache at the Hague and from there to visit the Fokker factory in Holland.

Herr Fokker is a Dutchman and has continued his research work following the collapse of the German military machine. He is said to be considering the sale of his exclusive rights to other governments.

Danish Aeronautical Exposition Opens

Copenhagen, Denmark.—The largest exposition of flying machines ever held in Europe opened on April 12 in Copenhagen at the Tivoli. The President is Prince Axel, well known as an airman.

Vickers Announce Trans-Atlantic Service Rates

London.—Vickers, Ltd., are about to start a transatlantic air service with airships which the company was building for the British navy when the armistice was signed, and which are no longer needed. *The Pall Mall Gazette* says. The passenger rate will be £48 ($240), and mail will be carried at the rate of £405 ($2,025) a ton.

The pioneer ship will have a gas capacity of 1,200,000 cubic feet, and engines of 1,000 horsepower. Larger ships are being designed to carry 200 passengers.

Aeroplanes and Accessories to Be Feature of Birmingham Fair

A feature of the British Industries Fair for 1920, beginning late in February, will be a display of aeroplanes, aeroplane accessories and aeroplane engines. The Birmingham Industries Fair dates back to medæval times.

Prince Albert Now Royal Air Force Staff Officer

Captain H.R.H. Prince Albert, K.G., R.A.F., second son of the King, has been appointed from Staff Officer to be Captain in the Administrative Branch of the Royal Air Force.

Brazil Appropriates $500,000 for Military Aeronautics

The sum of $500,000 has been appropriated by Brazil for organization of an aviation service, purchase of aeroplanes, establishment of aviation schools and the buying of various accessories.



A German Rumpler biplane now in the hands of the French Air Service

England Organizing Extensive Aerial Police

It is stated in the "Daily Mail" that the post of "Chief Constable" and other ranks in the new British Aerial Police will shortly be open to young flying men with military experience.

The "Force," which will work in close conjunction with the existing Customs and Police Services, will be directed by Major General Sir F. H. Sykes, the Controller of Civil Aviation, and will be divided into two branches—a number of pursuit scouts and a larger body of aerodrome police. A distinctive uniform will be worn.

The police will be stationed at various points around the coast to be known as "arrival stations," at which all machines coming from overseas will be compelled to land. It will be the duty of the ground branch of the Air Police to examine the machines for contraband, concealed cameras, and arms, and to ascertain from the pilot, whose papers will be examined, the course which he intends to follow in the British Isles.

Prohibited areas, such as powder factories, arsenals, dockyards, and the like, will be pointed out to him, and aerodromes notified in advance of the registration mark of his machine.

The chief duty of the pursuit scouts will be the heading off of negligent aviators from prohibited areas. An orange or other small object dropped from an aeroplane through the roof of a powder-mill is considered by experts to be sufficient to cause an explosion, and regulations in this respect are likely to be very drastic.

The scouts, in all probability, will be armed with machine guns, from which tracer bullets will be fired as a warning or to shoot down air pirates, as no other means of dealing with fugitive lawbreakers in the air at present suggests itself.

Many ground and other signals are at present being devised by a special branch of the Air Ministry.

National Aircraft Factory Bought By Straker-Squire

London.—The National Aircraft Factory at Edmonton, England, has been sold to the Straker-Squire Company for $700,000 to be used for the manufacture of motor cars.

Commercial Aerial Routes Being Established Throughout England

The Tynemouth Corporation, having received an offer from a company to run pleasure trips with four-seater biplanes, has referred it to a sub-committee with plenary powers to act on the understanding (*a*) that sole permission will not be granted; and (*b*) that the proposed service shall not interfere with the free enjoyment of the foreshore.

A project is on foot to establish an air service between Leicester and Hunstanton with the object of conveying business people between the two places daily.

At the last meeting of the Leeds Chamber of Commerce, Sir John McLaren, who presided, moved a resolution expressing the opinion of the Council that the commercial use of aircraft in the transit of passengers, mails and goods had become a question of immense moment, and calling the attention of the City Council to the desirability of placing before the Government the claims of Leeds as an aeroplane centre and clearing-house for the West Riding of Yorkshire. The resolution was carried.

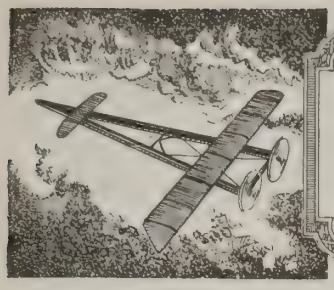
The Great Northern Aerial Company propose to make one of their stations at Bray, and have applied to the Bray Urban Council for permission to build hangars for six large machines.

Two companies are seeking the permission of Folkstone Corporation to provide flying facilities. The Blackburn Aeroplane and Motor Company (of Leeds) wrote asking if the corporation would consider a scheme to include a service between Folkestone and adjoining towns and short pleasure trips for the amusement of residents and visitors.

The Central Aircraft Company (of Kilburn) wrote that they would be prepared to arrange a regular passenger service between Kolkestone and London, besides circular tours by aircraft and aerial exhibitions of all kinds.

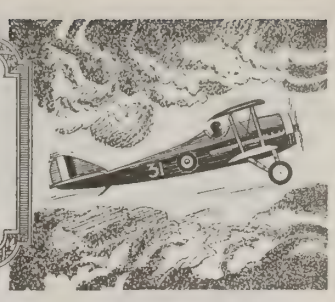
British Insurance Companies Fix Premiums

Insurance companies are already fixing the premiums for insurance against personal accidents for flying passengers and for goods sent by air. It is stated that the rates for personal risk will probably work out as follows per £100: London-Paris, 3s.; England-Italy, 5s.; England-Bombay, 25s. Rates will vary according to the nature of the journey. For a journey overland from North Africa to India, for instance, the premium will be about 10s. per cent., whereas the oversea route to India from South Africa will be 17s. 6d. per cent. Inside the United Kingdom the premium for passengers is provisionally fixed at 2s. 6d. per cent. The percentage rates for goods-carrying have already been fixed as follows: United Kingdom, 7s, 6d.; England to N. France, Belgium, and Holland, 15s.; England to N. Italy and Scandinavia, 80s.; England to Egypt, 120s.; England to India, 300s.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



The Long Distance Racing Model

THE accompanying drawing shows a long distance type of racing model such as aeromodelists use for hand launched long distance work, and is a good model for use in the coming contests.

The best models of today have a wing of the shape shown in the drawing, and this is the most efficient from an aerodynamic standpoint.

A model of this kind will give pleasure to the builder besides winning prizes in model aeroplane contests, and the sight of one of these long distance models high in the air is truly an interesting sight, and the exercise derived from following these models for long distances is worth the time spent in building one.

While the construction is simple, a good many points must be taken into consideration when building or designing a model of this kind. One of the principal points is to have the model clean cut so it can pass through the air easily as the motor is cut down until the minimum of power needed to propel the model through the air is reached. This is accomplished by covering the wings top and bottom with some sort of thin skin, fine silk or tissue paper, doped with a solution to shrink the covering and also fill the pores.

The proper method of determining the correct amount of rubber to use is to put on a large amount of rubber and gradually cut it down until the minimum is reached that the model will fly with. The correct amount will just keep the model in the air until the rubber winds out completely. Flat rubber about 3/16" wide and 1/32" thick is the best for models.

Although the model shown is for hand launched flights, a simple landing chassis can be designed to attach to the "A" frame and for use in R.O.G. (rising off ground) contests.

To construct the model the frame should be made first. The main spars are made of spruce 5/16" x 3/16" and 40¼" long. The spars are joined together at one end to form the apex of the frame. It is necessary to taper the spars slightly and bind with thread and glue. The other ends of the spars are notched and a strip of streamline spruce 12¼" long and ⅜" x ⅛" thick is fastened with thread and glue also. To strengthen the frame, a cross piece is fastened to the spars about midway and a piece of steel wire is bent to a half circle with loops at each end and fastened to the spars. This wire acts as a brace and a terminal for the bracing wires as well. The bracing wire is the thinnest of steel piano wire, and is fastened to the loops, pulled taut as possible and fastened at a point where the rear spar and the main spars are fastened together. A frame of this shape is called an "A" frame on account of its shape.

Bearings for the propellers are fastened to the ends of the rear spar. These bearings are for allowing the propeller shaft to turn without friction, and are made of 1/32" I. D. copper tubing. The propeller shaft on steel piano wire just small enough to pass through the hole in the tubing and still turn freely. These bearings can be made in different styles, as shown in the drawing to the right.

A piece of steel wire is bent to a "V" shape, and the ends bent back to form a hook. This is used at the apex of the frame to fasten the wires to, and is also bound with thread and glue.

The propellers are made to the shape shown at the bottom of the drawing and should be 12" long and are carved out of a block of white pine 1" thick. If the model builder does not think himself capable of making the propellers correctly he can purchase them from any model supply house, as well as bearings, wood, bamboo, etc.

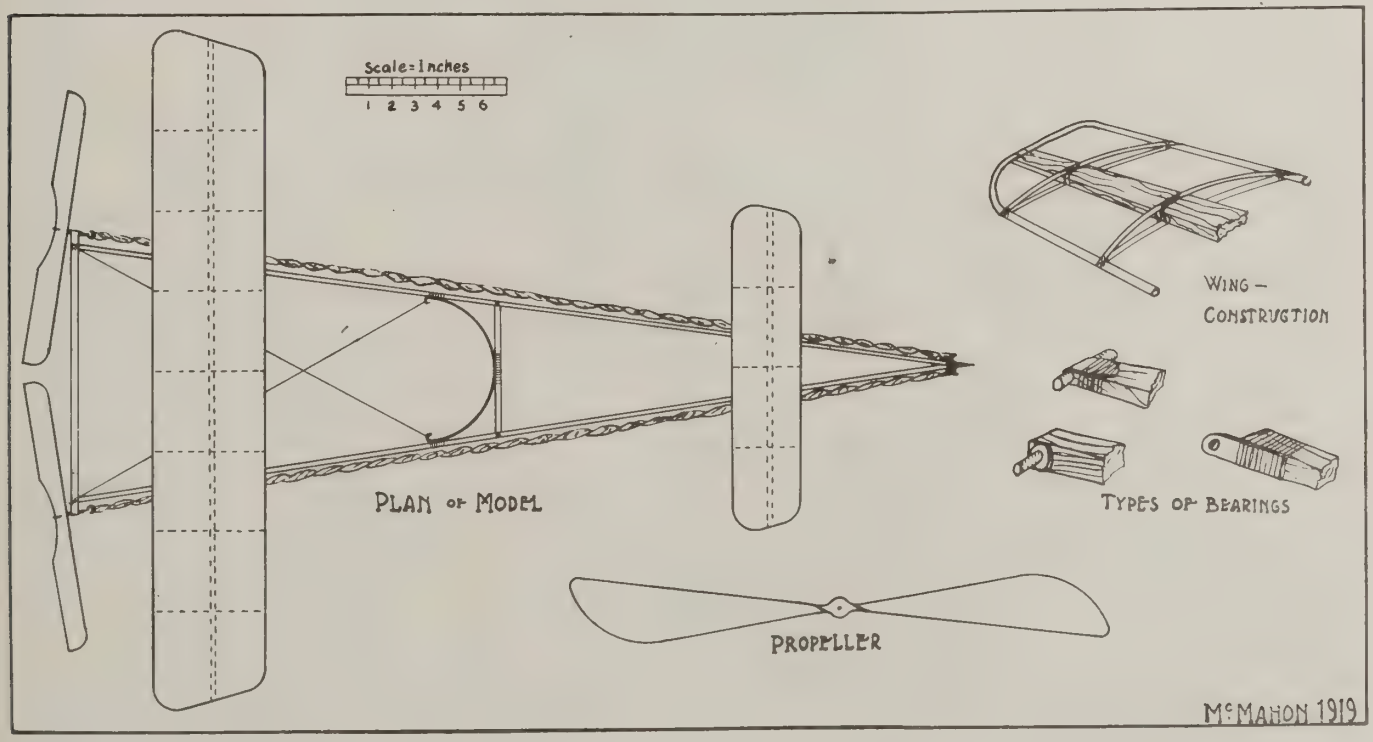
The wings are made up of bamboo and spruce, the spruce piece running through as a sort of back-bone. The spar is 3/32" x 1/16" and the ribs, trailing edge and entering edges are bamboo.

The construction of the wing is clearly shown at the right of the drawing. All dimensions can be ascertained by using the scale at the top of the drawing.

The wings should be covered with what is known as "Gold Beaters Skin." This can be purchased at model supply houses or from wholesale druggists. The skin is applied by heating over a fire and then fastened to the frame of the wings with Amberoid glue and doping with a mixture of Ambroid glue diluted with acetone and banana oil.

When covering the wings cover one side then dope it, after which the other side can be applied and doped.

If constructed properly this model will make flights of 3,000 feet and over. One thing must be remembered and that is, the ribs of the wings as well as the edges must be only 1/16" round bamboo, if made thicker the model will be too heavy.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Mr. Suburbia: "I think it's perfectly wonderful to think aviation has reached such a high stage that an aeroplane can land on the deck of a warship."

Aviator: "That's nothing, I once landed my 'plane on the roof of a railway signal-box in France."

When President Wilson was driving through London he glanced up at the Aerial Squadron sent to escort him on his triumphant way.

"Hum!" he mused. "No need to add a fifteenth point to my Peace Terms. They've got plenty of Freedom of the Air."

Old Gent on the allotment, as aviator crawls from his machine: "Excuse me, sir, but from a psychological point of view, I am interested in accidents."

Aviator: "Thanks, old Top" (sarcastically). "Anything I can do for you will be a pleasure."

Old Gent: "How good of you! Well, would you mind telling me the actual words you used when you collided with the other machine?"

Aviator: "By all means. When I saw old Jones coming for me in his 'bus, I turned to Bill, my observer, and I said: 'What the blithering deuce does he want here?' And Bill shook his head quietly and replied—'I'm bunkered if I know.'"

"You say you love my daughter?"

"Love her, my dear sir, I would die for her. For one soft glance from her eyes, I would jump out of my aeroplane to get down to her quickly."

"Indeed. Well, I'm something of a liar myself, and I fancy one is enough in a small family like mine."

One of our aviators took a Highland soldier up for a flip, and when he descended he thought he would astonish him by his knowledge of the Scottish language.

"I suppose, Jock," he said, "you're nearly kilt wi' the cauld (killed with the cold) in the air?"

"No, mon," remarked Jock, "but I'm cauld wi' the kilt in the air."

British Want Weir

Airmen are not happy over the rumored change at the Air Board. They are singing, "Oh, Weir, tell me weir has our Highland laddie gone."—From *Aircraft* (London).

1940

Twenty Years After: "Get out your 'plane, old thing, and fly across with me to join the East Kent Hounds."

"Thanks, old bean, but I'm fixed up. Just flipping off to the Pole to attach myself to the whaling fleet. Grand sport. What?"



The Adventures of "Cyril" in the Aviation World. In the Drawing Office

(From *Flight*)


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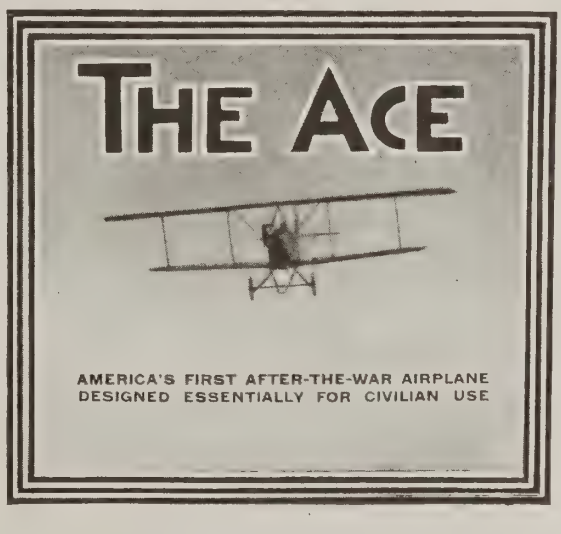
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(*Continued from page* 337)

to these bearings through connection into the regular pressure feed line of the Liberty engine. Thus the Liberty oil pump supplies them, avoiding an added complication of having a special oil pump in the turbo-compressor unit itself. An oil seal is made against oil leakage around the shaft by providing a washer that is a loose fit on the shaft, and which has a spherical shape on one side. This side fits against a seat in the bearing chamber, against which it is held by a spring. This construction is very effective in preventing oil escapage into the turbine casing or blower housing, as the case may be.

In several of the earlier Sherbondy designs, trouble was experienced with the gas casing, which had a tendency to warp and thus throw the turbine nozzles out of place to such an extent that they touched the turbine wheel in several instances. Other troubles were encountered due to warping of the nozzle ring and the misshaping of the nozzles themselves. In the last design, as seen in Fig. 4, however, these difficulties were overcome in large measure by bolting the nozzle ring to the compressor casing and permitting the gas casing to deflect as much as it pleased with no ill effect upon the running of the device. It is just such problems as these that Sherbondy has had to overcome throughout, for the intense heats encountered, the restricted space available for the unit and the necessity for extreme lightness are three diametrically opposed factors which must be compromised into the best possible assembly.

At F in Fig. 4 is seen the diaphragm, which is the controlling unit for operation automatically of the by-pass valves V which allow escape of exhaust in proportion to the supercharger speed required for efficient working of the turbo-compressor at any given altitude. Obviously, at ground level, these by-passes are open, whereas, at the maximum height, they should be entirely closed so that all exhaust energy is given to the turbine to operate it at top speed. In effect, the automatic control works upon the principle of differential pressure on the two sides of the diaphragm, which opens and closes a piston valve in the casting. This, in turn, operates a system of oil ports through which oil flows under pressure to open or close ports that govern the action of the small pistons of the by-pass valves. The action is thus devoid of shocks and any movement of the by-passes is gradual and lacking in jerkiness that would tend to produce undesirable shocks to the mechanism as a whole. In other words, the control system has been arranged to have a more or less damping action, making any changes in the amount of gases passing to the turbine gradual rather than sudden enough to cause trouble.

In operation of the supercharges, the air is drawn in through the passage G, is carried around by the impeller A and in its compressed state is sent to the carburetors through the outlet J. The exhaust gases are led to the gas chamber N, whence they are directed through the nozzles R to the buckets K of the turbine wheel B. The exhaust gases, after giving up their energy, are discharged through the exhaust outlet E, into which the valves V also send any gases which are not sent through the turbine, due to the automatic control feature already mentioned. There is in reality no connection between the turbine and the compressor, except through the common shaft S, which is fitted with a labyrinth between the two rotors to prevent pressure escape from the turbine to the blower casting. As a means of cooling, water is circulated through the space W between the two parts, a provision which was quite essential to assist in keeping down the excessive temperatures.

The Sherbondy machine was designed to have an air discharge capacity of 692 cubic feet per minute, when the Liberty engine is operating at 1700 revolutions per minute. Under these conditions, it is intended to handle any pressure requirements of the engine from nothing at sea level to approximately 7.5 pounds per square inch at 20,000 feet, at which altitude the atmospheric pressure is about half that at sea level.

It is computed that the theoretical horsepower available in the exhaust gas of the Liberty engine is about 80, whereas, with a compressor efficiency of around 60 per cent, the horsepower required to compress the air is about 32, indicating that the overall efficiency of the system is somewhere in the neighborhood of 40 per cent.

In the next article, the Moss turbo-supercharger will be touched upon, and consideration will be given to some of the arguments advanced for and against the turbine system of compression.

(*To be continued*)

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(*Continued from page* 340)

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Horizonal stabilizer	54.8
Vertical stabilizer	19.6
Elevators (each 22.8 sq. ft.)	45.6
Rudder	26.5
Total supporting surface	800.6

Weights

	(*Pounds*)
Net weight—machine empty	4,359
Gross weight—machine and load.	6,223
Useful load	1,864
Loading (weight carried per sq. ft. of supporting surface)	7.77
Loading (per R.H.P.)	18.85

Useful Load

	(*Pounds*)
Fuel	977
Crew	360
Useful load	527
Total	1,864

Performances

Maximum speed, horizontal flight	91 M.P.H.
Minimum speed, horizontal flight	55 M.P.H.
Climb in 10 minutes	1,800 feet
Maximum range at economic speed	575 miles

Engine

Liberty 12-cylinder, Vee, 4-stroke cycle.	
Horsepower (rated)	330
Weight per rated horsepower	2.55 pounds
Fuel consumption per hour	32 gallons
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Oil consumption per B.H.P. per hour	0.03 pounds

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Engine box	6′ 2″ x 4′ 4″ x 2′ 9″	1,645

— —

Treatment of Special Steels and Metals by Means of Baths of Metallic Salts

The success of modern industry is intimately linked with the development of the physical qualities of the metals with which the engineer must construct his machines and high-speed tools.

Just as the manufacture of steel made more rapid strides than the scientific production of steel alloys, it is only recently that attention was turned to the important effect that scientific heat treatment has on the physical qualities and endurance of steel and special metals.

One of the great obstacles which the engineer has to surmount in heat treatment is the oxidation which follows and the defects which appear in the finished and polished pieces. In many cases a new sand-blast treatment and repolishing makes possible the removal of the exterior carbonization and oxidation.

Mr. Fuller, of H. Fuller & Company, Ltd., of Sheffield, England, undertook researches for the purpose of overcoming these difficulties and after several years of research discovered a process by means of which the engineer and manufacturer of steel can prevent frequent difficulties. Mr. Fuller's method consisted of plunging all parts of the machine which requires the heat treatment (such as high-speed steels, steel alloys, carbon and non-ferrous steels) in a transparent bath of metallic salts composed of a special new composition. The Fuller treatment claims the following advantages:

(1) It completely obviates oxidation, carbonization, chipping or pitting of surfaces and produces a surface of uniform durability.

(2) It reduces working and deformity to a minimum.

(3) It greatly reduces the possibility of damage of the quality of the steel or metal as a result of too long an immersion, because this metal is a complete protection against noxious gases.

(4) It permits the employment of inexperienced workers in the foundry.

(5) It reduces the number of furnaces necessary because of the very high rate of speed with which the work can be accomplished.

(6) The number of defective hardening treatments is reduced to a minimum.

(7) It is suited to all purposes. The salts being transparent and the piece under treatment is visible during the entire heating process up to the moment it reaches the exact temperature desired.

(8) It is possible to register the temperature much more exactly than in an entirely enclosed furnace. Every practical workman will appreciate the tremendous advantage which there is in the possibility of approaching within a few degrees of a desired temperature when it comes to special metals. The immersed article must acquire at the proper rate the same temperature as the molten mass which surrounds it.

(9) The salts are not toxic; they are consequently harmless and without noxious effect on the immersed metal or the worker himself; there is no noxious gas emitted and in consequence the furnaces require neither cover nor pneumatic device for conducting noxious gases.

The transparent non-oxidizing "Fuller" salts are already in use by the most important mechanical construction firms and everywhere they have been furnished they have resulted in new orders. This discovery is considered to have great possibilities if, as contended by the inventor, it gives infallible results.

(Translated from *Le Revue Technique*)

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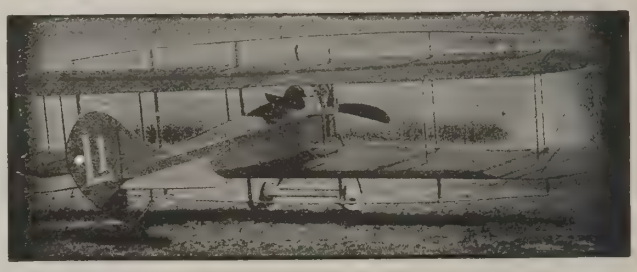
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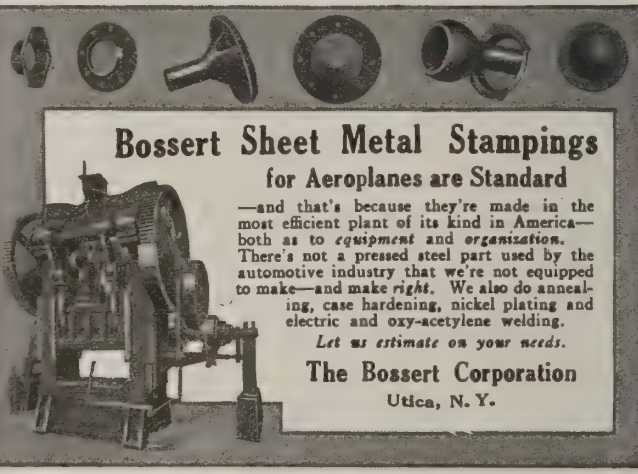
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AERIAL AGE WEEKLY

Vol. 9, No. 8 MAY 5, 1919 10 CENTS A COPY



Atlantic City and the Steel Pier, Where the Pan-American Aeronautic Convention and Exposition is Being Held

Secretary of War Baker Opens Second Pan-American Aeronautic Convention, Exposition and Contests by Wireless

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VOL. IX NEW YORK, MAY 5, 1919 NO. 8

SECRETARY OF WAR BAKER OPENS SECOND PAN-AMERICAN AERONAUTIC CONVENTION, EXPOSITION AND CONTESTS BY WIRELESS

THE opening of the Second Pan-American Convention, Exposition and Contests at Atlantic City on May 1st was an even greater event than the memorable First Convention which was held in New York two years ago and was opened by President Wilson by wireless from the White House.

The opening ceremony at Atlantic City on Thursday was a most impressive event. Thousands of representatives of different countries, government, state, civic and aeronautical authorities and famous airmen were present on the Steel Pier and the Atlantic City Municipal Air Port on Albany Avenue, Atlantic City.

Secretary Baker Opens Event by Wireless

Secretary of War Newton D. Baker opened the event by a wireless addressed to Mr. Alan R. Hawley, president of the Aero Club of America. His message read in part:

"I send greetings to the Second Pan-American Aeronautic Convention. Here in France, one sees the great triumph which has been achieved in aeronautics during the war and American contribution is valuable and significant.

"(Signed) BAKER, Secretary of War."

* * *

Other messages were received by wireless, cable and mail from over one hundred authorities throughout the world. A few of the messages follow:

The Second Pan-American Aeronautic Convention and Exposition comes at a time when it cannot fail to be of vast benefit to the course of aeronautics in North and South America. The Aero Club of America, the Aerial League of America and the Pan-American Aeronautic Federation are doing an excellent work in staging this important event and deserve the support of a progressive people of North and South America.

REAR ADMIRAL BRADLEY A. FISKE, U.S.N. (Retired).

* * *

Not since the ending of the war has there been anything so auspicious for the cause of aviation as this Pan-American Aeronautical Convention and Exposition. Substantial results making for the progress of aeronautics in the new world are bound to come from this important gathering.

MAJOR THOMAS S. BALDWIN.

* * *

North and South America again joins hands for the advance of aeronautics in the Second Pan-American Aeronautical Convention and Exposition being held at Atlantic City. The three organizations under whose auspices this important event is taking place are to be congratulated on the warm spirit of co-operation existing between them that makes possible the grand success of such an immense undertaking. May the same fine spirit of co-operation animate the people of all the countries of Pan-America until all these countries are knit by airways and these airways teem with planes and dirigibles, so that not only the industry itself will be on a basis of stable and steady development with all the peoples of the Western Hemisphere more closely knit in mind and heart and deed for the advancement and protection of our common civilization.

SANTOS-DUMONT.

Atlantic City is destined to become the Aeroplane City of America. Everything is pointing in that direction.

SAMUEL P. LEEDS,
President of the Chamber of Commerce, Atlantic City.

* * *

It gives me pleasure to extend a hearty greeting to the thousands in attendance at the Second Pan-American Exposition and Convention. This event marks another epoch in Pan-American Aeronautics and makes for the continued co-operation of Latin America and North America in the advancement of the great art of aviation.

The recent war has shown the necessity of aerial preparation, and nothing will do more for the protection of the Western Hemisphere in future wars than a strong and united effort in the upbuilding of every phase of aviation in all the countries of North and South America. This Exposition and Convention are bound to be of far-reaching benefit in the furthering of the cause of aeronautics.

ALAN R. HAWLEY,
President of the Aero Club of America.

* * *

The atmosphere is the greatest thing on earth. It is a great ocean, sweeping unbroken around the entire globe. Aeronautics and aviation mean the conquest and utilization of this great ocean, for travel and transportation of all kinds. The establishment of great aerial highways and of an aerial Coast Patrol taking in all the countries and the coasts of the Western World is a great end to be achieved. Such events as this Pan-American Exposition and Convention will greatly aid in furthering these desirable ends.

REAR ADMIRAL ROBERT A. PEARY, U.S.N.

* * *

Good Start for Contests

Ten aviators were ready to participate in the contests on the first day and a number started in different parts of the country, and the flights are in progress as AERIAL AGE goes to press, complete reports of which will be given in the next number of AERIAL AGE. The Atlantic City Municipal Air Port is a regular beehive.

Remarkable Exhibits on the Pier

The governments of all the Allied and Latin-American countries and their aeronautic, sporting, scientific, industrial and educational organizations have sent commissions to the convention. Five hundred thousand people have been invited to attend. Aeroplanes constructed on bird lines and painted in color resembling birds is one of the striking new developments in aeronautics which will be witnessed at the Second Pan-American Exposition on the Steel Pier and at the Atlantic City Air Port on Albany Avenue, Atlantic City. This will be the first demonstration of the construction and painting of aircraft to look like birds.

The Curtiss Company will exhibit an aeroplane that is a reproduction of the oriole, and the Cantilever Company may have a reproduction of several birds, one being the sea gull and the swallow, but the "Arrow" and the "Bullet" will predominate. Captain Ugo d'Annunzio, the son of the poet-aviator, has built a stunning aerial runabout, which is to be named "The Hummingbird."

There will also be exhibited models of all the types of aeroplanes and seaplanes used by the Allies in winning the war in the air. Each model is made on scale and bears the insignia of the country which originated it.

Eighteen special films of aeronautic events taken overseas and in the United States, illustrating every phase of aeronautics, will be shown. These include French and American official films of military and naval aeronautic activities.

Among the scientific exhibits will be the exhibits of new scientific instruments for aerial navigation. The announcement and description of these is held as a surprise. Two of the instruments to be exhibited were built especially to solve the most difficult problem of aerial navigation in connection with trans-Atlantic and trans-Pacific flying.

A most magnificent exhibit will be the photographic exhibit, showing every type of aircraft of every nation and aerial views of cities and places in every part of the world.

This last exhibit is entitled "Around the World by Air" and shows aerial views of all the capitals of the world, the most important cities of the world and such far-off places and historic landmarks as the Tower of Babel, the Pyramids, the Black Sea, Mount Atlas, the Alps, Pekin, China, and other views all photographed recently from the air.

The complete set of French Aerial Warfare paintings of Lieut. Henri Farre, official painter for the French War and Navy Departments, which includes the portrait of all the famous French Aces and of Major Lufberry and Lieut. Col. William Thaw.

In the reception rooms will be the first showing of the thrilling and historic paintings of aerial events dealing with America's participation in the aerial side of the war, painted in Europe by Lieut. Charles E. Ruttan, U. S. N.

The Aero Club of America is exhibiting the magnificent International Aeronautic Trophy, the Curtiss Marine Flying Trophy, the Collier Trophy, and the Michelin Trophy. All together there will be ten trophies exhibited representing the highest expressions of aeronautic art.

First Aeronautics Convention to Discuss Every Aspect of Aeronautics

The Convention which is to be held on the magnificent Steel Pier is to be the first convention where every aspect of aeronautics has been discussed. The program, which is most thorough and extensive, is as follows:

Aero Parade in Aeronautic Exhibit

Panorama of Air Service Section of Liberty Loan Parade of May 3d, as planned to date:

1. Three men dressed as aviators marching abreast, center man carrying the American flag, both end men carrying banner reading, "Help us to keep flying together."
2. Curtiss aeroplane to be taxied in parade, prominent overseas pilot driving, observer in rear seat, with two Lewis guns, etc.
3. Motor float containing four of best aeroplane engines—Curtiss, Hall Scott, Gnome (rotary), and Hispano-Suiza.
4. Motor float containing stripped aeroplane fuselage showing interior construction.
5. Penguin (aeroplane which will not fly, used for preliminary instructions) to be taxied in parade.
6. Float containing aerial photographic exhibit (with one enlarged photo of trenches, cameras, etc., and portable dark room on trailer).
7. Liberty motor in operation on float. (Lieut. Maynard, who will accompany this float, has flown the Liberty engine in France over 321 hours, and has never had an accident or been forced to land through engine trouble. Lieut. Maynard holds the world's record for looping the loop, having performed 318 consecutive loops in 67 minutes at Romorantin, France.)
8. Fully assembled Morane Parasol (Monoplane) mounted on float, with famous overseas pilot accompanying it (probably Lieut. Paul Beaer).
9. Float containing medical research exhibit, revolving chair, rebreather, etc. Two nurses in attendance, showing men taking actual tests.
10. Float of aerial bombs and machine guns, four kinds of each.
11. Float carrying Ruggles "Orientor," showing it in taking actual test. Man with signs will show what student is doing, when learning acrobatics, such as loop the loop, tail spin, etc.
12. Float containing hospital plane, used to carry disabled men to hospital.
13. Float containing portable field machine repair shop, showing lathe, forge, etc., in actual operation.
14. Float with portable field lighting apparatus, showing dynamo, searchlights, etc., for night landings.
15. Float containing fully assembled Spad biplane with famous overseas ace accompanying it (probably Capt. Rickenbacker). Sign will read, "Capt. Rickenbacker enlisted as a chauffeur; one year later he became America's premier Ace." (Indefinite: Small boy on same float shooting small paper aeroplanes into crowd with Victory Loan printed on their wings.)
16. Truck with cable drum, towing observation balloon sausage, 90 feet long, with trailer following.
17. Six touring cars of men dressed as aviators.
18. Indefinite—Float showing cadets at their ground school, training, showing them assembling machine gun and working on wing.

Flying above parade will be an acrobatic team doing stunts, a formation of five to seven planes, a large Handley Page following, and a large dirigible balloon. A balloon company will also have a balloon in Van Courtland Park, showing men leaping in parachutes, if weather permits (April 26 to May 3).



A view up the Boardwalk at Atlantic City, with the Traymore in the foreground, as it will appear to the aerial visitors at the Pan-American Convention

TROPHIES AND PRIZES TO BE COMPETED FOR AT ATLANTIC CITY IN MAY

THE following Trophies and Prizes have been offered for competition at Atlantic City, and from other points to Atlantic City from May 1st to May 31st. All contests are open to Army, Navy, Aerial Mail and Civilian aviators.

(1) **$6,000 Curtiss Marine Flying Trophy.** Mr. Glenn H. Curtiss has offered a prize of $1,000 to go to the first entrant for the Curtiss Marine Flying Trophy who covers the distance of 1,000 miles without stopping. The contest for this prize will open on May 1st, and continue until it has been accomplished.

The entrants who wish to compete for this prize during the Convention can fly over the 60-mile course between the Steel Pier and Cape May Air Station. This magnificent trophy is exhibited at the Art Salon on the Steel Pier.

The entrant's record will be counted as a flight for the Curtiss Marine Flying Trophy under the rules for the 1919 competition for this trophy.

(2) **The $5,000 Pulitzer Trophy,** offered for annual competition, to be awarded this year to the aviator who makes the best record in flying land or water planes from anywhere to Atlantic City, and from Atlantic City to anywhere during the month of May.

Competitors for this trophy will start from or end at the Atlantic City Air Port, on Albany Avenue, Atlantic City, which affords unsurpassed facilities for both land and water aeroplanes.

(3) **The Boston Globe Trophy and $1,750** cash prizes to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record in flying from Atlantic City to Boston, or from Boston to Atlantic City during the month of May; $500 and $250 to the aviators who make the second and third best records, respectively.

Start or ending will be on the Atlantic City Air Port.

(4) **The Cleveland Plain Dealer Trophy and $1,750** cash prizes to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record flying from Atlantic City to Cleveland, or from Cleveland to Atlantic City during the month of May; $500 and $250 to the aviators who make the best records, respectively.

Start or ending will be on the Atlantic City Air Port.

(5) **The Detroit News Trophy and $1,750** cash prizes to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record flying from Atlantic City to Detroit, or vice versa, during the month of May; $500 and $250 to the aviators who make the best records, respectively.

Start or ending will be on Atlantic City Air Port.

(6) **The Atlanta Journal $1,750 prizes,** to be awarded to the three aviators who make the best record flying from Atlantic City to Atlanta, Georgia, carrying the Journal.

Start or ending will be on Atlantic City Air Port.

(7) **Colonel William A. Bishop's "Ace of Aces Trophy,"** to be awarded to the aviator who makes the best record in flying from Toronto to Atlantic City, or vice versa, during the month of May.

Start or ending will be on Atlantic City Air Port.



Looking toward the ocean at the upper end of the Boardwalk. The Marlboro-Blenheim is in the foreground

(8) **The $3,000 New York Herald Aero Efficiency Prizes,** to be awarded as follows: $1,000 to the aviator who covers the greatest distance in a non-stop cross country flight, starting from or ending at Atlantic City between May 1st and May 30th with an aeroplane of any horsepower.

$250 to each of the aviators who cover the greatest distance in a non-stop flight from or ending at Atlantic City between May 1st and May 30th with aeroplanes of:

(a) not over 100 h.p.
(b) not less than 100 h.p. and not over 200 h.p.
(c) not less than 200 h.p. and not over 400 h.p.
(d) not less than 400 h.p. and not over 600 h.p.
(e) not less than 600 h.p. and not over 800 h.p.
(f) not less than 800 h.p. and not over 1000 h.p.
(g) not less than 1000 h.p., and over without limit.

Start or end of flight will be on Atlantic City Air Port.

(9) **$2,000 Intercollegiate Seaplane Speed Trophy,** for annual competition, to be awarded to the college whose representative makes the best record in flying twenty times over a five-kilometer course at Atlantic City each Saturday off the Steel Pier during the month of May.

This trophy is to become the property of the college that wins it three years in succession.

(10) **$2,000 Intercollegiate Aeroplane Trophy,** for annual competition, to be awarded to the college whose representative makes the best record in flying twenty times over a five-kilometer course at Atlantic City each Saturday during the month of May. To be held at the Atlantic City Air Port.

This trophy is to become the property of the college that wins it three years in succession.

(11) **$2,750 Cash Prizes for Intercollegiate Weekly Seaplane Races,** offered under the terms of the will of Mr. Samuel H. Valentine. These "Expense Money" prizes are to be awarded in connection with the races for the Intercollegiate Seaplane Trophy described above. They are offered to assist the collegiate aero clubs and individuals making the entries to defray the expenses connected with entering a team. Competing for same will not, therefore, endanger the amateur status of the competitor.

There will be four prizes awarded each Saturday for the best speed made in competition for the annual Intercollegiate Seaplane Trophy as follows:

First prize	$250
Second prize	150
Third Prize	100
Fourth Prize	50

Colleges are permitted to appoint new entries and enter different machines for each race. The name of the entrant and type of machine need not be announced until half hour before the race.

(12) **$2,750 Cash Prizes for Intercollegiate Weekly Aeroplane Races,** offered under the terms of the will of Mr. Samuel H. Valentine, are to be awarded in connection with the weekly races for the Intercollegiate Aeroplane Trophy described above. They are offered to assist the collegiate aero clubs and individuals making the entries to defray the expenses connected with entering a team. Competition for same will not endanger the amateur status of the competitors.

There will, therefore, be four prizes awarded each Saturday for the best speed made in competition for the Annual Intercollegiate Aeroplane Trophy, as follows:

First Prize	$250
Second Prize	150
Third Prize	100
Fourth Prize	50

Colleges are permitted to appoint new entries and enter different machines for each race. The name of the entrant and the type of the machine need not be announced until half an hour before the race.

(13) **The Intercollegiate Dirigible Trophy.**
This may not be held until later in the season.

(14) **The Intercollegiate Balloon Trophy.**
This may not be held until later in the season.

All of these contests, except the intercollegiate, are open to Army, Navy, Marine Corps, intercollegiate and civilian aviators. The rules are similar, so that a competitor can compete for more than one trophy in one flight.

The intercollegiate contests are open to both graduates and undergraduates.

(15) **Open Seaplane Speed Contests** (with handicap) for twelve laps of five miles each. To be held on Decoration Day. Prizes to be awarded under the terms of the will of Samuel H. Valentine.

First Prize	$1,000
Second Prize	500
Third Prize	250

(16) **Aerial Commuting Prizes.**

1. To be awarded to entrants who cover the greatest total distance in commuting by air from anywhere to Atlantic City during the period of the Convention.

First Prize	Gold Medal
Second Prize	Silver Medal
Third Prize	Bronze Medal

(Distance to be measured in straight line.)

2. To be awarded to entrants who make the greatest number of trips in commuting by air from anywhere to Atlantic City during the period of the Convention.

First Prize	Gold Medal
Second Prize	Silver Medal
Third Prize	Bronze Medal

3. To be awarded to entrants who make the longest flight in commuting from anywhere to Atlantic City during the period of the Convention. (Distance to be measured in straight line.)

First Prize	Gold Medal
Second Prize	Silver Medal
Third Prize	Bronze Medal

(17) **$1,000 Opening Day Prize,** offered under the terms of the will of Samuel H. Valentine for land aeroplanes and seaplanes. To be awarded to the aviators making the best records in competing for any of the trophies and prizes on May 1st, flying from Atlantic City to anywhere, and from anywhere to Atlantic City. Competitors starting from Atlantic City will start from the Municipal Air Port at Albany Avenue, Atlantic City. Competitors from other points will end their flights at the Air Port.

(18) **$1,000 Aerial Runabout Races,** offered under the will of Mr. Samuel H. Valentine for speed competition between one-seater aeroplanes of not over 75 h.p. Two races are to be held as follows:

First race, Saturday, May 10th, at the Atlantic City Air Port, Albany Avenue, Atlantic City:

First Prize	$250
Second Prize	150
Third Prize	100
Fourth Prize	50

Second race, Saturday, May 17th, at the Atlantic City Air Port:

First Prize	$250
Second Prize	150
Third Prize	100
Fourth Prize	50

These races are to be held at the Atlantic City Municipal Air Port.

(19) **The Akron Trophy,** presented by Major Thomas S. Baldwin, to be presented to the pilot who makes the best time with any type of aircraft in flying from Akron to Atlantic City, or Atlantic City to Akron, during the month of May.

Start or landing must be made on the Atlantic City Air Port.

(20) **$100 West Point Merchants' Association Prize,** to competitor of Pulitzer Trophy who starts from or ends at West Point, Mississippi.

(21) **Atlantic City Aero Club $25,000 Trans-Atlantic Prize.**
The Atlantic City Aero Club is offering a cash prize of $25,000 to be awarded to the pilot of the first aircraft to fly over the Atlantic, which starts from or terminates at Atlantic City during the month of May. Entry blanks giving the conditions can be obtained from the Secretary of the Aero Club of America, 297 Madison Avenue, New York, or from President Albert T.

Bell, of the Aero Club of Atlantic City, Atlantic City, New Jersey.

Start or landing must be made on the Atlantic City Municipal Air Port

Other prizes offered since date of writing will be announced at Atlantic City at the opening of the Convention and Exposition.

Stops and repairs are permitted during the cross-country races, but the pilots will be penalized five per cent. of the total distance they cover for every stop under one hour, and ten per cent. for stops over one hour and under six hours.

The aviators may make as many attempts as they wish for the Trophies and Prizes. The distance covered in each case will be measured in straight line flight from the point of departure to the point of landing.

Flights made for any of the above mentioned Trophies and Prizes will count for the Pulitzer Trophy.

DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

THURSDAY, MAY 1ST
Opening of Convention and Exhibit.
AFTERNOON—Reception at Aeronautic Hall on the Steel Pier. Addresses by United States Government, State and aeronautic authorities.
EVENING—Aero Show and addresses by officials.

FRIDAY, MAY 2ND
AFTERNOON—Aero Show. Preliminary tests of aircraft.
EVENING—Moving pictures and address on Flying For Sport and Pleasure.

SATURDAY, MAY 3RD
AFTERNOON—Aerial contests.
EVENING—Ball.

SUNDAY, MAY 4TH
MORNING—Memorial service by eminent Divine for the dead airmen.
AFTERNOON AND EVENING—Reception to allied aces and heroes of the air and their parents and announcement of the award of the Aero Club of America Medal of Valor, and the Aerial League of America Diploma of Honor.

MONDAY, MAY 5TH
AFTERNOON—First parachute contest for $500 Bennett Prize.
EVENING—"The Large Dirigible and Its Value for Transportation." Representatives of railroads, express, steamship and other transportation organizations invited to attend.

TUESDAY' MAY 6TH
AFTERNOON—Illustrated addresses on "Aerial Forest Patrol." Forestry Department of every State invited.
EVENING—"Work of Aerial Police Squadrons, and Why Every City Should Have One."

WEDNESDAY, MAY 7TH
AFTERNOON—Aerial Mail Day. Illustrated address on, and consideration of, "Aerial Mail Planes." Chairman of Post Office and Post Roads Committees of House of Representatives and Senate, and Postmaster General Burleson invited to deliver address. 26,000 United States Postmasters, and Chambers of Commerce of 13,000 cities invited to attend. (To be held in Convention Hall.)
EVENING—Illustrated addresses on the "Need of Municipal Aerodromes, and the Part to be Played by Aircraft in City Planning." Chambers of Commerce and City Planning Commissions of 13,000 cities invited to attend. (To be held at Curtiss Hall.) Meeting of Federation of Women's Clubs to be held in Convention Hall.

FRIDAY, MAY 9TH
AFTERNOON—Tests of Aircraft for Saturday's Races. Second parachute competition for the $500 Bennett Prize.
EVENING—Illustrated addresses on "Latest Developments in Aerial Warfare and Adventures in Aerial Warfare," told by famous aces.

SATURDAY, MAY 10TH
AFTERNOON—Army, Navy and Marine Corps Day. Aerial contests and tournament.
EVENING—United States Army and Navy Officers' Reception. Reception and addresses at Aeronautic Exhibition Hall of the Steel Pier.

SUNDAY, MAY 11TH
AFTERNOON AND EVENING—Presentation of the flags by different States of the United States to the Aero Squadrons representing the States. Each State will present a flag to each Aero Squadron, the members of which were overwhelmingly natives of that State. The presentation will be made by representatives from the State and the Aero Club and Aerial League branch of that State. All States and cities are invited to send delegates, and the Army, Navy and Marine Corps to send representatives.

MONDAY, MAY 12TH
AFTERNOON—Demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night." All national advertisers and advertising agents invited to attend.
EVENING—"Pan-American Aerial Transport Over Land." Addresses by members of the commissions of the 20 Latin-American Republics.

TUESDAY, MAY 13TH
AFTERNOON AND EVENING—"Pan-American Aerial Transport Over Water." Addresses by members of the 20 Latin-American Republics' Commissions.

WEDNESDAY AND THURSDAY, MAY 14TH AND 15TH
AFTERNOONS AND EVENINGS—"The Airways and Aerial Transport in Europe, Canada, Africa, Australia and Asia."

FRIDAY, MAY 16TH
AFTERNOON AND EVENING—"Aerial Navigation Instruments for Flying Over Land and Water." Aviators, navigators, scientific instrument makers and aeronautic experts invited.

SATURDAY, MAY 17TH
AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.
EVENING—Ball.

SUNDAY, MAY 18TH
AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH
AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."
EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH
AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST
AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.
EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22ND
AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can Be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Topographic and Climatic Factors in Relation to Aeronautics."

FRIDAY, MAY 23RD
AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulations of Air Traffic." (First day). Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH
AFTERNOON—Races and contests.
EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH
EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK

MONDAY, MAY 26TH
EVENING—"Aeronautic Engineering Problems and Their Prospective Solution." Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH
EVENING—"Factors That Increase the Efficiency for Large Dirigibles." "Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH
AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."
EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH
AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."
EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)
AFTERNOON—Aircraft contests.
EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST
AFTERNOON—Aircraft contests.
EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST
AFTERNOON AND EVENING—Award of prizes and diplomas for all events.



THE NEWS OF THE WEEK



Navy Flying Boat of F-5 Type Flies 1,250 Miles in 20 Hours

Norfolk, Va., April 26.—Four naval aviators, in a seaplane of the F-5 type, Serial No. 3589, made a new world's record for an endurance flight when they flew, officially, 1,250 miles in twenty hours and ten minutes. The record was made during a continuous flight from 11:42 A. M. April 25 until 7:52 A. M. April 26. Throughout the entire afternoon and night, and often bucking a strong breeze over the Chesapeake Bay and the Virginia Capes, the F-5 described a great circle, extending northward to the mouth of the Potomac River and then eastward to the Atlantic Ocean, sweeping over the Capes and then inland to the naval station.

Those in the machine were Lieutenant Commander H. B. Grow, Ensign Delos Thomas, Ensign R. F. Souther and Ensign Irvine. The men took turns at piloting the machine, but Commander Grow was at the wheel most of the time.

The men in the machine ate three meals during the flight. These consisted of coffee and sandwiches, with a plentiful supply of water. Coffee was carried in vacuum bottles, but they did not retain the heat as well in the air as they do on the ground, according to reports from the air station.

When the machine left the naval base it carried 850 gallons of gasoline. When it landed there was scarcely two gallons in its tanks.

The F-5 is an improved type of flying boat that the Navy Department intended using in patrol duty for war purposes. It is much different from the ordinary fliers that were used during the war for coast patrol. It has a wing spread of 105 feet, is much faster than the old type, and has larger gasoline tanks. The machine was built by Curtiss, and is known as a "kite boat." It is equipped with twin Liberty motors.

While the official records claim only 1,250 miles covered by the machine, naval officers say this does not include the distance it traveled during the first few hours it was in the air, when most of the flying was over Hampton Roads and Norfolk. It was stated by one officer that the actual distance covered was considerably more than given in the official figures. Only exhaustion of the fuel supply forced the ship to land, as the motors were functioning perfectly.



Sidney Chaplin has established commercial air lines on the Pacific Coast

National Advisory Committee for Aeronautics to Report on Civil Aerial Transport

Washington, D. C.—A report on civil aerial transport is soon to be issued by the National Advisory Committee for Aeronautics. The report will embody specific recommendations looking toward the development of commercial flying.

Passenger Carrying Service Established in Kansas City

Kansas City, Mo., April 21.—The Central Aircraft Corporation announced inauguration of a passenger-carrying service aeroplane.

Rates for passengers were quoted at $10 and up for any distance within 150 miles of the city, dependent on weather conditions.

Lieut. James H. Smith, former instructor at Richfield, Tex., will pilot a Curtiss two-passenger machine as a starter for the company.

Sidney Chaplin Announces Commercial Air Lines for Pacific Coast

Los Angeles, Cal.—Considerable interest has been aroused here because of the announcement, this week, by Sidney Chaplin, brother of the world-famous Charlie, of a commercial transportation air line which will link the principal cities of the Pacific coast together in close communication.

The Chaplin Company will undertake to operate a passenger carrying service, using both hydro-aeroplanes and aeroplanes. Initial operations will be those between the mainland of the local harbor and Catalina Island, the famous resort recently purchased by William Wrigley, Jr., millionaire sportsman. Chaplin has been given a ten-year franchise for exclusive aerial activities on the island.

Planes carrying five and ten passengers will be operated between the two points, the first flight being scheduled for June 1st. The distance between Catalina and the mainland is twenty-six miles.

The principal cities of the Pacific coast will also be included in the Chaplin plan, depots to be established at Pasadena, Hollywood, Long Beach, San Diego, Coronado Beach, Del Monte and San Francisco.

Although not generally known, Sidney Chaplin has been interested in aviation since the early days and was on the inside of the game in the days of Bleriot, Farman, Fournier and Paulhan.



The Martinsyde "Raymor" in which Captain W. Morgan will attempt the trans-Atlantic flight from St. John's, N. F., as soon as favorable weather prevails

Business Men to Use New York-Atlantic City Airline

From present indications, the passenger carrying service to start on May first between New York and Atlantic City will be extensively used by business men during the Pan-American Aeronautic Convention, which starts on that date. Mr. Stewart, of the James Stewart Company, has booked a passage.

Flying Boat Makes Duration of 9 Hours 37 Minutes

What is believed to be the best duration record for a flying boat carrying a full load and five men was made by Ensign M. J. Dwyer, U. S. N. R. F., and four others in the crew. The flight was made at Queenstown, U. S. N. Air Station, Ireland, November 9, 1918, two days before the armistice was signed, and details of the record have not before been given out to the general public

The flying boat was a twin Liberty-motored Curtiss H-16 (No. 1048). The crew was composed of First Pilot Ensign M. J. Dwyer, Second Pilot Ensign G. L. Compo, Observer Ensign Tobin, Second-Class Radio Electrician Walcott, and Engineer Shea, C. M. M.

Three hundred and thirty gallons of fuel were carried, of which 315 gallons were consumed. Thirty gallons of oil were consumed. Water temperature 152°. Revolutions of the engines: starboard, 1200 R.P.M.; port, 1100 R.P.M. "Marble" propellers used. Oil temperature: starboard, 27; port, 22.

The weight carried was made up of 165 pounds extra fuel in case of a forced landing at sea; two 230-pound R.F.C. bombs (which were not used, but carried throughout the flight), a radio set weighing 150 pounds; machine gun mounts, etc.

Model H-16 Flying Boat has the following general specifications: Span, upper plane, 96′ 6″; span, lower plane, 58′ 11″; overall length, 26′ 1″ chord, both planes, 7′ 1″; total supporting surface, 1164 sq. ft.; gap between planes, 8′ 1″; weight without engines, 4313 lbs.; power plant, 2632 lbs.; live load, including three men, 3216 lbs.; total weight, 10,172 lbs. The loading is calculated $\frac{10{,}172.00}{1164.33} = 8.74$ lbs. per sq. ft.

Load lifted per horsepower $\frac{10{,}172}{550} = 18.5$.

The machine ascended at 7.29 in the morning and landed at 5.06 P. M., a total duration of 9 hours and 37 minutes. Average air speed, 80 knots.

On the preceding day the same machine and crew, with the addition of one more apprentice radio operator, remained in the air continuously for seven hours and ten minutes.

These flights were witnessed by Commander J. C. Townsend, U. S. N., commandant of U. S. N. Air Base, Queenstown, Ireland, and Commander F. R. McCrary, U. S. N., Naval Aviator, commander of U. S. N. Air Stations in Ireland.

Ensign Dwyer is at present stationed at Experimental Squadron, U. S. N. Air Station, Hampton Roads, Virginia.

The Transatlantic Flight

While the aviators at St. Johns, Newfoundland, are being delayed day by day by adverse weather conditions, the Navy flying boats are being rapidly put into shape for the transatlantic flight.

The NC-1, the NC-3 and the NC-4 are now practically prepared to start on the first lap of the flight, from Rockaway Beach, L. I., to St. Johns, N. F.



The Martinsyde "Raymor," powered by a 285 H.P. Rolls Royce motor, being assembled at St. John's, N. F. This plane has completed its final tests

A test of the NC-3 on April 23 proved that the ship could not rise from the water with but three of her four motors in operation. It was hoped that this feat could be accomplished, as it would permit of a great range of endurance. On another test, with four motors, she carried ten passengers and a load of 29,500 pounds in a two-hour flight.

The route which naval officers are said to have decided upon is by way of the Azores. A direct flight to the British Isles is not considered possible with the NC type of flying boat equipped with four motors, owing to the amount of fuel required for these motors.

The cruiser Baltimore, with mechanics and sailors from the Rockaway Naval Station who have handled NC flying boats, sailed on April 25 for Halifax. It is understood she will land the crew from Rockaway at Broyle Harbor, Newfoundland, which will be the jumping off place for the transatlantic flight.

Other destroyers are ready to get under way at once in order to patrol the selected route.

A cable message from the British Air Ministry, asking reasons for the failure of Harry G. Hawker, Australian aviator, and Capt. Frederick P. Raynham, his British rival, to start their transatlantic flights was received at St. Johns on April 23. Unfavorable conditions, however, persist, and present prospects do not point to an early start. Hawker and Raynham are therefore marking time, impatiently waiting for a change in the situation.

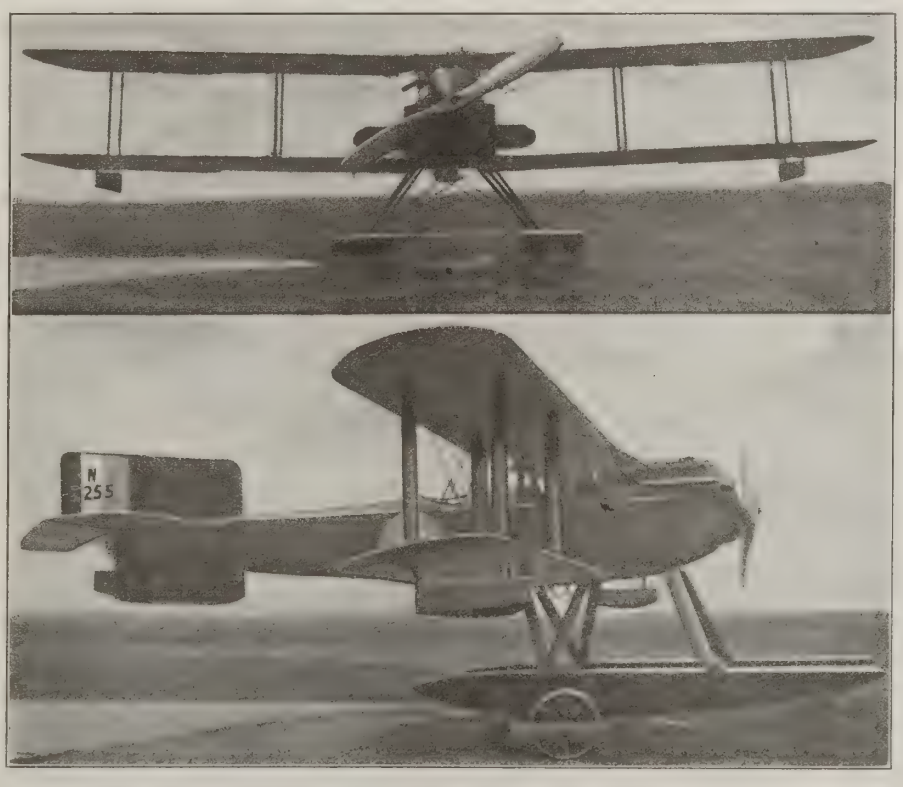
Meanwhile, more rivals are getting their planes into shape. The four-motored Handley Page biplane is en route to St. Johns on the Furness liner, Digby. She is expected to stop at Harbor Grace, where the Handley Page hangar has been completed.

With the plane is Major Trygue Gran, a Dane, who was the first man to fly across the North Sea, receiving the Military Cross as a reward for that exploit in August, 1914. Major Gran is assistant pilot and navigator.

The pilot, also on the Digby, is Major Brackley. The observer is Rear Admiral Mark Kerr and the fourth man of the crew is a wireless operator whose name is not announced.

A dispatch from Berlin states that Baron Gemingen, nephew and successor of Count Zeppelin, intends to attempt to cross the Atlantic in the Zeppelin dirigible known as the Z-72. The armistice conditions prevent the completion of the airship, on which about two weeks' work is required.

The cruiser is 715 feet long with a diameter of more than sixty feet. She



Front and side view of the Fairey III-C biplane equipped with a 360 H.P. Rolls Royce motor. This plane is very similar to the Fairey plane, which will soon attempt to fly across the Atlantic

will have seven motors of 240 horsepower each. Her gas capacity will approximate 2,000,000 cubic feet. Baron Gemingen estimates that the distance from Friedrichshaven to Washington can be covered in sixty-eight hours, depending upon the weather. It is asserted in Zeppelin circles that under favorable conditions the new airship could make the round trip without landing.

Aero Club of Syracuse Formed

Syracuse, N. Y.—Several prominent business men of Syracuse have organized an aero club here. Pressure will be brought to bear to secure a municipal landing field, and several of the members propose to purchase aeroplanes. Affiliattion with the Aero Club of America is to be arranged.

Curtiss Aeroplane Makes Delivery Despite Harbor Strike

Newark, N. J.—The first consignment of merchandise transported by air from New York to Newark was received in that place on April 19. It was brought in a 100 horsepower Curtiss biplane, by Joseph Bennet, an aviator employed by the Curtiss Company, and consisted of a shipment of women's wearing apparel weighing 175 pounds.

The clothing was "shipped" by Bamberger & Co., of Newark, and it was explained that this method of transportation had been decided upon to escape the delay that would be caused in the event that New York harbor were tied up by the threatened strike.

The International Aeronautical Commission Draws Up Regulations

The work of the International Aeronautical Commission, appointed by the Peace Conference to formulate regulations for the operation of aircraft, has practically completed its work. A tentative draft of the regulations has been issued, which is awaiting the approval of the Peace Conference.

Provision is made for the licensing of aircraft under the nationality to which they belong. Tests for the licensing of pilots are prescribed in detail; these include not only flying tests, but examinations to determine the applicant's knowledge of the theory of aeronautics and aerodynamics, of motors and instruments, of aeroplanes.

All aeroplanes must carry a route book, containing information as to the nature of the airship, its registry number, and ownership; for each journey, name, nationality and residence of the pilot, the place, date, time of departure and landings, route covered, and incidents of trip.

Each nation is given the right to prohibit flying of planes of all nationalities over prescribed areas. Planes are not permitted to carry camera, war appliances and ammunition without special permission. Military planes are not to fly over foreign countries.

The registry number, to be painted on the under side of the lower wing, the upper side of the upper wing and on both sides of the helm, or on each side, in the case of aeroplanes, on the top part of the balloon under the car and on both vertical sides of the car, in the case of dirigibles and balloons, is to be assigned, as follows:

First, capital letters to indicate owner's nationality, as follows:

Belgium, B; United States, US; France, F; Great Britain, GB; Italy, I; Portugal, P.; Rumania, R.; Serbia, SB.

Second, small letters, characteristic of the nature of the airship: A, for aeroplanes; B, for free balloons; D, for dirigibles.

Third, figures and numbers to indicate the identity of the craft.

The registry numbers are to be circulated for the use of all nations.

A certificate of competence is required for all members of the crew, as well as the pilot.

Specific regulations for the arrangement and number of lights on all types of aircraft have been drawn up. For free balloons and dirigibles not under power, regulations are provided for indicating that they are at anchor, and cannot manoeuver.

Whistle signals are provided as follows:

In fog, rain or snow: 3 short blasts at intervals of 3 seconds.

Over landing point: Alternate blasts of 3 and 9 seconds duration at intervals of 3 seconds.

In case of distress: Blasts of 9 seconds duration at intervals of 3 seconds.

It is considered that the regulations drawn up will be accepted without amendment.



Chief Instructor Billy Parker, Harry Colburn, Bernard T. Daly, Peter Inglebritsen, Elizabeth Modeer, and Fidel Vela of the Dewey Aviation School

One Hour Flight from Springfield to Boston Wins Liberty Cup

Boston, Mass., April 26. — Lieut. Brownie Dallas today won the Hamilton-Coolidge cup offered by the New England Liberty Loan Committee for the aeroplane race from Springfield to this city. The flight occupied approximately one hour. Three of the four planes which started were forced by weather conditions to land in Worcester.

Lieut. Dallas reported that he came through areas of snow and rain, but had fair weather after passing Worcester. He was accompanied by Sergeant J. St. Croix, who acted as mechanician.

Aeroplanes and the Liberty Loan

An important phase of Liberty Loan demonstrations throughout the country is aeronautics. In New York, for instance, daily flights of all types of planes have been arranged. "Victory Way," the chief center for loan speeches and campaigning, is equipped with radio receiving apparatus and amplifiers, so that conversations on planes in flight are made audible through a large number of loud speaking megaphones. By this means, crowds have heard conversations between pilots flying at different altitudes over the city, as well as phonograph music played aboard dirigibles and submarines.

The work of the air circuses performing over various cities has won the encomium of the loan organizations.

Captain White, Chicago-New York Record Holder, Flies from New York to Washington in Good Time

Capt. E. F. White, U. S. Army, who made the record-breaking non-stop flight from Chicago to New York on April 19th, flew from New York to Washington in one hour and fifty minutes on April 21st. Captain White left Hazelhurst Field, L. I., at 11:30 a. m., and landed at Bolling Field, Washington, at 1:20 p. m. With him went H. M. Shafer, the civilian mechanic, who accompanied him on the Chicago to New York flight.

Book Reviews

KEEPING FIT ALL THE WAY. Compiled by Walter Camp.

The author preaches the gospel of health, strength, efficiency and happiness to men. He points out the danger to health and the economic loss consequent upon a man allowing himself to get out of good physical condition and he tells him how he may recover his impaired vitality and begin again to enjoy life—yes—and to do big things in life. The exercises given in this volume are founded upon those used by every man (or woman) between the ages of fifteen and sixty, or even beyond. This book is illustrated by many photographs explanatory of the exercises recommended. The U. S. Air Service is thinking seriously of adopting Walter Camp's method in keeping our Army and Naval aviators in trim.

Copies can be purchased at The Aeronautic Library, Inc., 299 Madison Avenue, New York City, at the price of $1.50 post paid.

Motion Picture Film Distribution by Aeroplane

New York, N. Y.—According to an airman recently returned from overseas, an enterprising motion picture corporation has engaged the services of Lieut. Georges L. Vezine, late of the Royal Air Force, to deliver films to the twenty-three film distributing points operated by the company. A Curtiss aeroplane is to be used. In emergency cases, officials of the company will be transported by this means.

The AIRCRAFT TRADE REVIEW

Salvage Section to Sell 1,000 Liberty Motors

The War Department authorizes publication of the following statement from the office of the Director of Sales:

The Sales and Salvage Section of the Army Air Service will shortly place on sale approximately 1,000 Liberty motors. The motors are 12-cylinder Vee type, 5-inch bore, 7-inch stroke, of 400 H.P. at 1700 revolutions per minute. They are equipped with a Delco generator, battery type ignition, 2 complete distributing units working independently, and with Zenith Duplex carburetors of the Special Liberty design.

All motors are new and represent a surplus over and above the anticipated requirements of the Air Service. Additional technical data and instructions to bidders may be obtained from the Sales and Salvage Section of the Army Air Service, Building "D," 6th and Missouri Avenue, Washington, D. C.

SKF and Hess-Bright Companies Combine

New York—The SKF Administrative Co., which was formed in May, 1917, to consolidate the interests of the SKF Ball Bearing Co. and the Hess-Bright Mfg. Co., has been merged with the Atlas Steel Ball Co. into a new company to be known as SKF Industries, Inc. The Atlas Company has for some time been controlled by the SKF Company.

The immediate purpose of the merger, which brings together the sales and executive departments of the three companies, is to facilitate the carrying on of important research work. For this purpose ground is being broken adjacent to the Hess-Bright plant in Philadelphia.

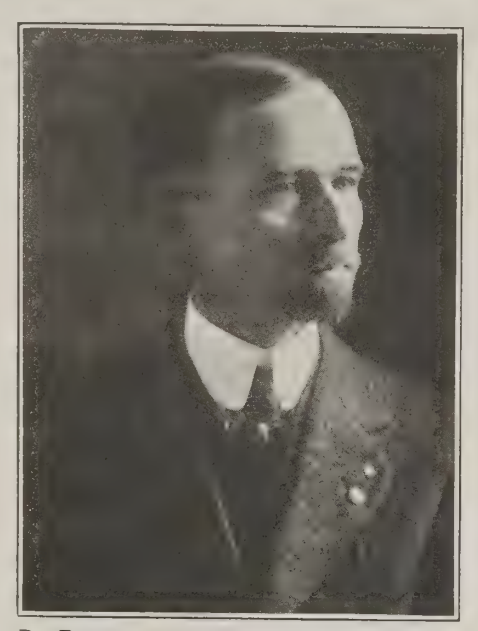
Major Halford in America in Interest of English Patents

New York—Major F. B. Halford, representing Engine Patents, Ltd., of England, which developed the Ricardo crosshead piston type engine used in the British tanks, and also the slipper design of piston, arrived in New York recently in the interest of American patents on these products, and also the possible development of them in America.

Major Halford was closely identified with the development of the B.H.P. aviation engine which were used on British bombing planes.

Goodyear Organizes Council of Industrial Relations

Akron, O.—In order to promote better mutual understanding between employer and employee, the Goodyear Tire and Rubber Co. have established a Council of Industrial Relations. Representation will be given to all employees who are American citizens, who have been with the company for six months continuously or a total service of one year. An executive council will be formed to handle all questions arising between employers and employees.



Dr. Brewster, First Physician to Use Aero Transport, Enthusiastic

Beaver City, Neb.—Dr. Frank A. Brewster, the first physician to employ an aeroplane for making professional calls, is enthusiastic regarding the future of aerial transport.

Beaver City, Neb., is a town of less than a thousand inhabitants. It boasts of one railroad. During the summer the dirt roads are excellent, but in the spring, only the old-fashioned horse and buggy can travel them. An automobile is useful for a few months during the year.

Dr. Brewster, one of the best-known physicians in southern Nebraska, is obliged to do a great deal of traveling, for his calls take him to Hendley, Wilsonville, Stamford, Oxford, Edison, Arapahoe, Holbrook and Cambridge in Furnas county, and also to the larger cities in neighboring counties—McCook, Stockville, Elwood, Alma and Holdredge.

When Lieut. Stevens returned from the service, he was so optimistic over the future of air travel that he persuaded Dr. Brewster to purchase a Curtiss JN-4D-2 plane from the Curtiss Company. Lieut. Stevens will act as pilot and he will also teach Dr. Brewster how to fly.

Aluminum Goods Spending $1,250,000 on Plant Additions

Manitowoc, Wis.—The Aluminum Goods Mfg. Co., with branch factories in Two Rivers, Wis., and Newark, N. J., will this year invest approximately $1,250,000 in the enlargement of the Two Rivers and Manitowoc plants.

M. A. M. A. Rules Suspended to Permit Members Exhibits at Atlantic City

New York, April 21.—The Motor and Accessory Manufacturers' Association rule with regard to shows was suspended insofar as the aeroplane exhibition at Atlantic City is concerned, at the monthly directors' meeting, so that members of the M. A. M. A. may exhibit.

Status of War Department Aircraft Contracts

Washington, D. C.—An official statement recently issued reports that 74 per cent. of the Bureau of Aircraft Productions's contracts have been cancelled, 25 per cent. delivered, and 1 per cent. remaining of those in force on November 9, 1918.

Production and Delivery of Aircraft Guns

Washington, D. C.—At the date of the signing of the armistice there were 54,436 Browning guns on order. Ninety-eight per cent. of the contracts were cancelled. The remaining 2 per cent., 1,030, have been delivered.

31,969 Lewis guns were on order on November 11. Seventy-five per cent. of the contracts were cancelled, and 8,085 guns delivered since that time, in completion of the remainder of the contracts.

As to Vickers aircraft guns, 66 per cent. of the contracts, which called for 11,779 guns, were cancelled. The remaining 4,049 guns have been delivered.

Bureau of Aircraft Production Withdraws Contract Cancellations

Washington, D. C.—Dring the week ended April 12, 1919, the Bureau of Aircraft Production withdrew cancellations and suspensions of contracts to the amount of $2,640,879, thus reducing the total of cancellations and suspensions of contracts since the armistice from $500,679,617 to $498,308,738. These withdrawals of cancellations and suspensions are practicaly all for spare parts and accessories. Following is a summary of the value of cancellations and suspensions of contracts to date:

	Value	*Pct. of total*
Engines and spare parts	$275,929,088	55
Aeroplanes and spare parts	164,129,759	33
Chemicals and chemical plants	18,014,611	4
Instruments and accessories	10,674,840	2
Balloons and supplies	9,137,403	2
Fabrics, lumber, and metals	7,302,295	1
Miscellaneous	12,850,742	3
Total	$498,038,738	

American Veneer Co. Soon Ready for Production

Hayward, Wis.—A concern manufacturing veneers, veneer panels and other select hardwood products, is being established here by the American Veneer Co., incorporated last year with a capital stock of $150,000. Work will start at once on a factory, 180 x 250 ft., to be ready about June 15, and to employ from 100 to 150 men.

Small Electric Drill Brought Out By Baltimore Manufacturer

Black & Decker Mfg. Co. of Baltimore have brought out two new models of electric drills possessing the pistol grip and trigger switch in common with the larger sizes of drills ranging from ⅜" to ⅞" size and the electric valve grinder.

The new 3/16" and ¼" models are one-

hand drills, which is made possible by the pistol grip and trigger switch. The tool is handled like an automatic pistol, the current being controlled by pulling the trigger without the necessity for changing the position of the hand holding the drill. In addition to the advantage of convenience, this control saves the breakage of drill bitts so often caused by the drill sagging on the bit when the operator changes the position of his hands to switch off the current.

These two models have 1/6 horsepower motors with series compensated windings, and operate on any current from direct to 60 cycle alternating. Cooling is by means of a vane impeller mounted on the armature shaft, which causes a forced circulation of air all through the housing. Gears run in grease in a grease tight compartment like an automobile transmission.

No load speed of the 3/16" drill is 1600 R.P.M. Energy consumption, 175 watts. No load speed of the ¼" drill is 1200 R.P.M. Energy consumption, 175 watts.

The automatic valve grinder is driven by a 1/6 horsepower electric motor which operates an oscillating spindle in a long, steady sweep similar to the motion obtained in hand grinding, but many times more rapid. The photo shows the trigger control which this device possesses, as well as the drills.

Aeroplane Delivery for Bamberger Co.

The first sale of an aeroplane for use in delivering merchandise to suburban customers has been made by the Curtiss Aeroplane and Motor Corporation to L. Bamberger & Company, in Newark, N. J. Within the next few weeks the company will inaugurate a regular aeroplane delivery service between their main store in Newark and the Oranges, Montclair, Trenton and Asbury Park. They will use a Curtiss JN-4D training plane with an especially constructed body for package carrying.

The purchase of the plane came as the result of experiments which the company carried on during the time of the New York harbor strike, when great difficulty was experienced in getting deliveries from the New York branch to the main store.

Goods intended for the Newark store were sent to Garden City, L. I., via motor truck, loaded into the Curtiss machine and, 40 minutes later, Pilot A. Livingston Allan landed the plane, carrying 175 pounds of merchandise, in Ballentine Parkway, from where the transfer to the store was made.

The experiment proved so successful in the emergency test that the company immediately ordered an aeroplane to be used in making deliveries during the summer months to the cities along the New Jersey coast.

Personal Pars

J. K. Cravens has been appointed sales manager of the Duplex Engine Governor Co. He was formerly connected with the Excelsior Motor & Mfg. Co., Chicago, the F. A. Ames Co., Owensboro, Ky., and more recently with the Wright-Martin Aircraft Co., New Brunswick, N. J.

George L. Ritter, who has been with the company for several years, has been promoted to assistant sales manager. J. N. Ryan, recently discharged from the Air Service as a pilot, will cover New York, New Jersey and New England. R. Weston Doherty, who, it was recently announced, would cover this territory, will not be connected with the company.

H. S. Lyons, who for two years prior to his entry into the Aviation service had charge of the sales of C-H electric devices in the territory covered by the Chicago office of the Cutler-Hammer Mfg. Co., Milwaukee, has received his discharge and returned to the employ of the company, doing sales work in the magnetic shift department.

Dynamometer at Langley Field for Advisory Committee on Aeronautics

Washington.—The National Advisory Committee of Aeronautics will erect an aeroplane engine dynamometer at Langley Field for the purpose of testing aeroplane engines.

Air Service Orders 36 Free Balloons

Washington.—The Air Service has ordered 36 free balloons to be made out of the surplus kite balloon fabric. These will be used for early training of fliers, and especially to instruct them in meteorological phenomena.

Massachusetts Legislature Asked to Provide Aerial Landing Places

Boston, April 18.—The Massachusetts legislature has been asked to provide suitable aerodromes and landing places throughout the State in order that aviation may be developed in this territory. A bill designed to give the Highway Commission power to license aviators, and also to pick out places on which to land has been introduced.



Bamberger & Company, of Newark, N. J., have employed Pilot A. Livingston for their Curtiss JN-4D delivery aeroplane

Personal Pars

Leon W. Rosenthal, formerly a consulting electrical engineer and patent solicitor of New York, has been elected a vice-president of the American Bosch Magneto Corp., which upon the sale by the alien property custodian acquired the interests of the Bosch Magneto Co. Mr. Rosenthal will make his headquarters at the factory in Springfield, Mass., but will also have an office in New York City, at 223 West 46th street.

Mr. L. M. Bradley has resigned as manager of the Motor and Accessory Manufacturers, and has been succeeded by Mr. M. L. Heminway.

The Long Island Aviation Flying School

The Long Island Aviation Company, Inc., which maintains its Flying Field near Central Park, L. I., has facilities for giving complete courses in flying instruction, including a 400-minute course, followed by instruction in stunt flying, after which the pupil is qualified for a pilot's license.

At the present time the school is giving instruction to fifteen students under the flying tuition of Lieutenant Eytinge and John Petre. Mr. Petre has been flying at Central Park for three seasons and is well acquainted with Long Island flying territory.

The two Curtiss JN machines used have dual control and are ideally suited for short straightaway flying, stunting, altitude or distance flights, exhibition flights and flying for film producers. The flying field is 26 miles from New York. The roads are good and the field easily reached by automobile, or by train on the Long Island Railroad from either Penn Station or Flatbush Station, Brooklyn.

The officers of the company are Mr. R. Snowden Andrews, President; Mr. E. O. Downs, Vice-President, and Mr. E. W. Conkling, Secretary and Treasurer.

Machines are to be seen in the air every day except when stormy weather prevents. On Saturday and Sunday afternoons, especially, numerous passengers are carried. During the rest of the week most of the time is devoted to practical instruction and the care and operation of an aeroplane.

National Foreign Trade Council Urges Aerial Commerce

Chicago, April 26.—Demands that the United States establish overseas routes for speedy mail and express service, were made in the general report of the sixth convention of the National Foreign Trade Council, which came to a close today. The report was read by James A. Farrell, President of the United States Steel Corporation.

"This convention urges Congressional consideration of suitable plans for developing aerial navigation," reads the report. "The establishment of the necessary aids to such navigation, the investigation and development of the fundamental principles of commercial aeronautics, the promotion of airship service to overseas countries, are matters which demand the present establishment of a separate department of the Government.

"The convention suggests to local Chambers of Commerce the advisability of having public aerodromes in all centres that expect to develop large foreign markets."

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative

PILOTS

Dana C. DeHart
Edward V. Gardner
Robert F. Shank
Ira O. Biffle
Leon D. Smith
Gilbert G. Budwig
Trent C. Fry

John A. Jordan, Superintendent, Western Division
Paul L. Ferron, Manager, Belmont Park
Harry W. Powers, Manager, College Park
Lowell S. Harding, Manager, Bustleton
O. J. Sproul, Manager, Chicago
W. J. McCandlass, Manager, Cleveland

PILOTS

E. Hamilton Lee
Lester F. Bishop
Carroll C. Eversole
Charles I. Stanton
John M. Miller
Max Miller
Charles E. Bradley

One Year of Aerial Mail Proves Efficiency of Service

On the 15th of May the Postal Air Mail Service will have been in operation one year. The public will be invited by the Post Office Department to witness the flights on that day from New York and Washington. The same six planes with which the service was inaugurated, equipped with the same engines, will be in these flights. Lieut. J. C. Edgerton, who piloted the first air mail plane into Washington from New York, and who is now chief of flying operations of the Post Office Department, will take the mail from Washington to New York in the same aeroplane propelled by the same engine in which he flew to Washington with the mail just one year before.

When the air mail service was inaugurated it was predicted that the service would be the seven-days wonder, and it was declared that the maximum life of any of the planes would be 140 hours actual flying time.

The postal air mail service will close its first year's operation with the record of 200 flying hours in the life of several of its planes, 14,000 miles of flying per plane, and it transported by air a grand total of over 200,000 pounds of mail or about 8,000,000 letters. The fact that the six original planes, with their engines, have survived this year's service, flying through all sorts of weather, snow storms and wind gales, with sometimes forced landings, has demonstrated the feasibility of commercial air service, and that commercial flying is entirely a different proposition from flying in the military service.

Leon D. Smith, Aerial Mail Pilot, Holds Washington-New York Mail Flight Speed Record

Mr. Leon D. Smith is one of the thoroughly reliable pilots of the Air Mail Service of the Post Office Department. Like all the pilots in the air mail service, who are required to fly, if at all possible, in all kinds of weather, he has had his share of unfavorable weather during his flying trips over the air mail route.

Recently he made an exceptionally fast flight, for one of the smaller machines, from Washington to New York with low visibility. He carried 157 pounds of mail in a plane equipped with a 150 h.p. Hispano-Suiza engine and made the entire trip of 218 miles at an average speed of 111 miles an hour. The actual flying time was 1 hour and 58 minutes.

He entered the Air Mail Service and made his first flight December 19, 1918, and since has made regular trips on the air mail route between Washington and New York.



Aerial Mail Pilot Leon D. Smith holds the Washington-New York Postal Plane record

He graduated in the hydroaeroplane, flying boat and land courses of flying at the Curtiss School of Aviation, Hammondsport, N. Y., in 1913. His instructors were the celebrated Frances Wildman and Lansing Callahan, who have probably taught flying to more men than any other instructors in the country.

During 1913, 1914, and 1915, Mr. Smith gave exhibition flights in the Eastern and New England States, using both a Curtiss biplane and a Bleriot monoplane.

He was one of the first aviators to offer his services to the Government as an instructor in aviation after the declaration of war against Germany. He was assigned first to the Ashburn Field, Chicago, and then to the Chanute Flying Field, Rantoul, Illinois. In December, 1917, he was transferred to the Park Field, Memphis, Tenn.

At this field he taught every stage of flying, including acrobatics, cross-country and dual. He had charge of photographing the aerial highway 260 miles long and 20 miles wide through Tennessee from a height of 5,000 feet.

He was a Senior Flying instructor in the Army previous to his connection with the Air Mail Service.

He has had a total up to date of 2,500 hours in the air with very little breakage or accidents.

Padua-Vienna Aerial Mail Route the Longest in Europe

The Padua Vienna aerial mail service, which was inaugurated on March 2d, is the longest regular aerial mail route in operation, the distance being 300 miles. Four caproni biplanes, piloted by service aviators, in charge of Colonel La Polla, are the initial equipment of the service. Two machines leave Padua and two Vienna every third day.

Another French Aerial Mail Service Started

Paris.—An aerial post serving Nancy-Briey-Longwy was inaugurated on April 1st. The first trip took 3 hours; four mail bags were carried. It is said that passengers will be taken on this route shortly.

There is also to be a lateral postal service across France soon, from Nancy to Bordeaux, via Dijon and Chateauroux, thus obviating the useless transference of mails at Paris. The approximate distance, return, is 1,500 kilometers.

Aerial Mail for Warships on Target Practice in Operation

San Diego, Cal.—Seaplane delivery of mail for officers and men on all warships at target practice on the southern drill grounds off San Diego was announced today by Commander E. W. Spencer, of the naval air station at North Island. It was started on April 22 with the sending of mail to the cruiser Minneapolis, twenty miles at sea.

German Aero Mail Services Extended

A Berlin telegraph states that the regular aerial postal service, which has hitherto been carried on by a German aircraft company, between Berlin, Leipzig, and Weimar, and Berlin and Hamburg, will be extended during April to Hanover, the Rhineland, Westphalia, Frankfort, Breslau and Warnemünde. The service to Warnemünde will be particularly important for passenger and postal traffic to Scandinavian countries. Warnemünde will also be the starting point for oversea traffic by seaplane.

CURTISS M-F FLYING BOAT



THE Curtiss M-F Flying Boat meets the need for a substantial sporting boat which is suitable also for commercial flying where waterways present the best landing places.

The Curtiss F Boat, of which the M-F is an evolution, has won well-merited renown. Keeping up with the modern requirements, the new M-F Flying Boat occupies a prominent place in marine aeronautical development.

The number of parts have been reduced to a minimum, and simple fittings make possible easy rigging and convenient maintenance. Exposed metal fittings are nickle-plated, the hull is finished after the fashion of the best pianos, and the comfortable seating accommodations are noteworthy.

Control surfaces are rather large in area, making control effective and easy of operation.

An advantage in the placing of the engine is that it allows of minor adjustments while the machine is in flight, an advantage that cannot be claimed for the tractor seaplane.

One of the M-F Boats was recently flown to Atlantic City, and another shipped to Denmark for demonstration purposes. The shipping weight of the exported boat was 5,160 pounds. The weights and cubical contents of the three boxes were as follows:

Contents	*Dimensions*	*Weights (lbs.)*	*Cubic feet*
Hull	26'5" x 6'6" x 6'4"	2,550	1,088
Panels	22'3" x 3'9" x 5'11"	1,730	494
Engine	5'10" x 4'3" x 2'8"	880	66

The above plane was equipped with a Curtiss K-6 engine instead of the OXX, accounting for the difference in shipping weight as compared with the shipping data given later.

General Dimensions

Span, upper plane	49'- 9-3/8"
Span, lower plane	38'- 7-3/16"
Wing Chord, both planes	5'- 0"
Gap (at engine section)	6'- 4-5/64"
Length overall	28'-10-3/16"
Height overall	11'- 9-3/8"
Dihedral, lower plane	2°
Incidence	6°

Areas

	Square feet
Upper plane	187.54
Lower plane	169.10
Ailerons (each 22.43 sq. ft.)	44.86
Horizontal Stabilizer	33.36
Vertical Stabilizer	15.74
Elevators (each 15.165 sq. ft.)	30.33
Rudder	20.42
Total supporting surface	401.50

Weights (General)

	Pounds
Net weight, machine empty	1,796.
Gross weight, machine and load	2,432.
Useful load	636.
Loading (weight carried per sq. ft.)	6.05
Loading (per rated H.P.)	24.32

Weights (Useful Load)

	Pounds
Fuel	240
Oil	22.5
Water	36
Pilot	165
Passenger	165
Miscellaneous Accessories	7.5
Total	636.0

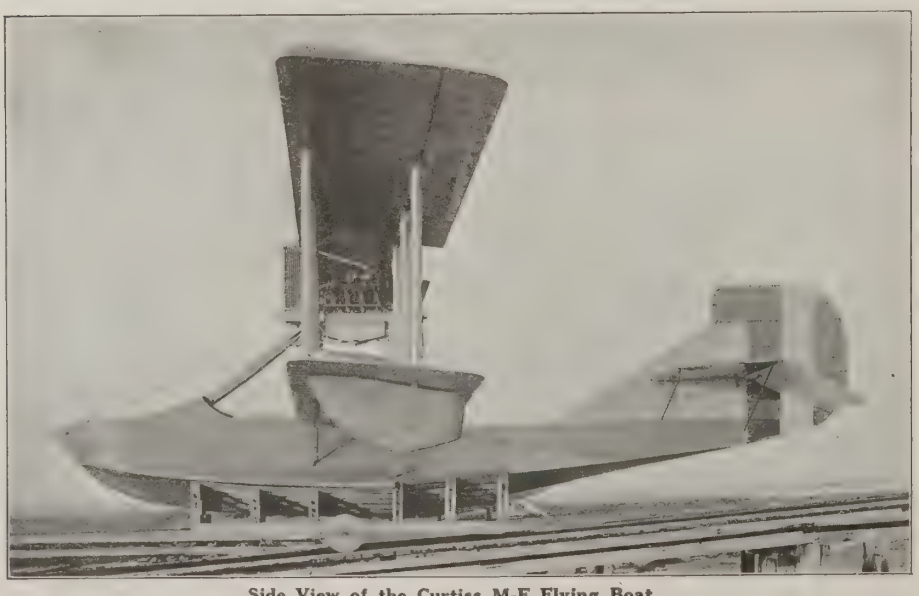
Performances

Speed, maximum, horizontal flight	69 M.P.H.
Speed, minimum, horizontal flight	45 M.P.H.
Climb in 21 minutes	5,000 feet
Maximum range at economic speed	325 miles

Shipping Data (Foreign Shipment)

	Dimensions	*Pounds*
Contents: Hull	26'6" x 6' 3" x 4'11"	2,390
Panels	22'3" x 5'11" x 3' 9"	730
Engine	5'4" x 3' 3" x 2' 9"	680

For domestic shipment, sidewalks and engine section are crated with hull; gross weight, 2,680 pounds.



Side View of the Curtiss M-F Flying Boat

Engine

The Model OXX is an eight-cylinder, four-stroke cycle water-cooled Vee type engine, rated at 100 H.P. at 1,400 R.P.M. Bore and stroke, 4½" x 5".

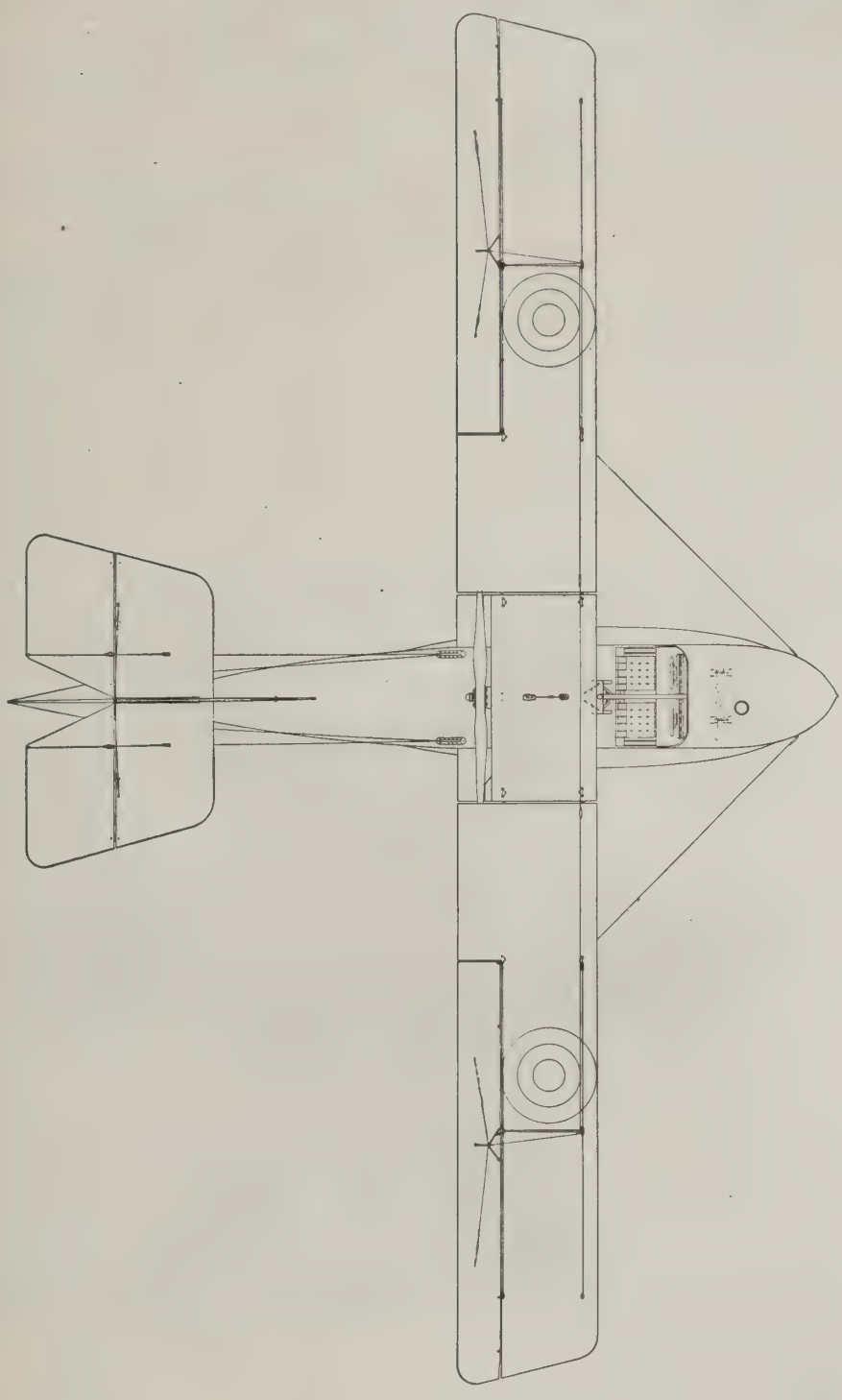
Fuel tank capacity, 40 gallons. Oil capacity in engine crank-case, 5 gallons.

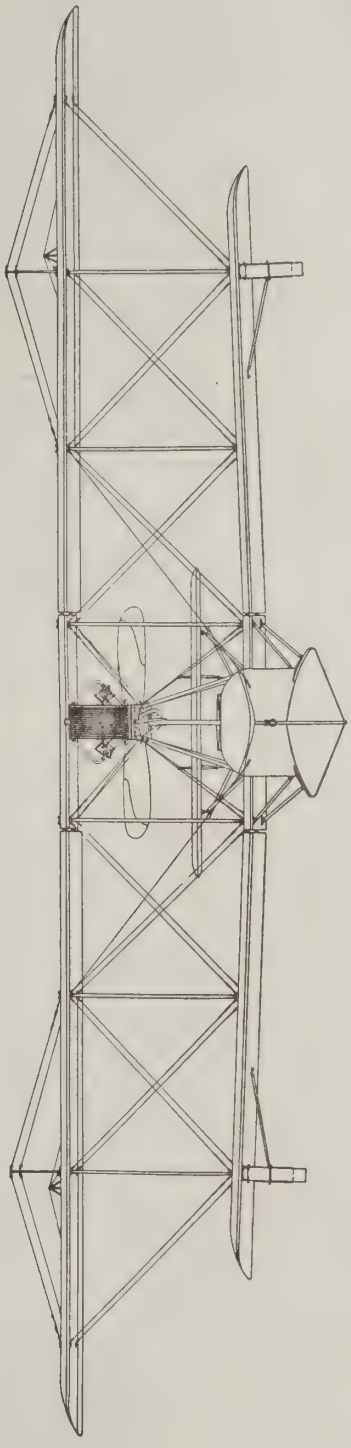
Consumption of fuel, 10 gallons per hour. Fuel consumption per B.H.P. per hour, 0.60 lbs.; oil, 0.03 lbs.

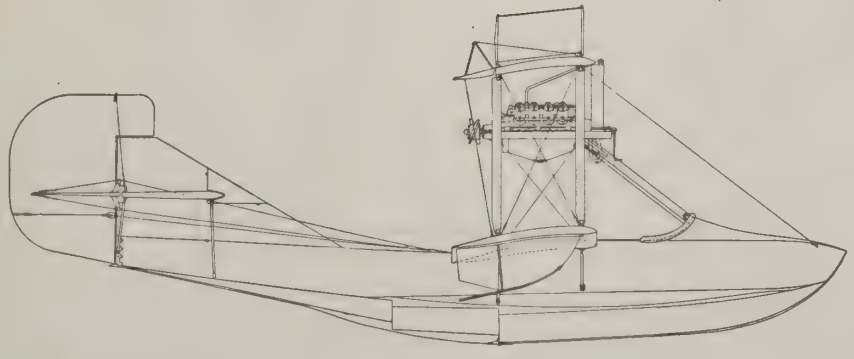
Weight, per rated horsepower, 4.01 pounds.

When desired the M-F boat is supplied with the new Curtiss K-6 engine, having 6 cylinders cast en-bloc, arranged in vertical position.

It is of aluminum construction. Rated horsepower, 150 at 1,700 R.P.M. Bore and stroke, 4½ by 6". Fuel consumption, .55 lbs. per B.H.P. per hour. Oil consumption, .03 lbs. per B.H.P. per hour. Weight of engine with oil or water, 417 lbs. Dead weight per rated horsepower, 2.78.







CURTISS MODEL M F
100 H.P. CURTISS OXX
FLYING BOAT

Scale of feet

1 2 3 4 5 6 7 8 9

McLaughlin

THE 80 H. P. AZTATL ENGINE

THE Aztatl engine, the first aviation engine constructed in Maxico and the first used there in the Aviation School, was first built in February 1917 under the direction of Colonel Alberto Salinas, in cooperation with Dr. Francisco Santarini, who, knowing the needs of the school and the elements with which to contend in manufacture, soon produced an engine with sufficient power to permit flying in the altitude of Mexico, and at the same time embodying simplicity of design and small number of parts, all standardized to facilitate construction and repair.

This engine is a radial type, aircooled; its six cylinders placed in groups of three in two parallel planes. Its general features reproduce the Anzani engine, which has won considerable recognition in the annals of aviation.

The body of the engine is formed of an aluminum crankcase cast in three parts; the front where the propeller hub is located, and the valve lifters of the engine, the central part which unites the other two and serves to support the cylinders, and the back part which holds the magneto and inside, the intake tube which carries the fuel mixture from the carburetor to the openings of each cylinder.

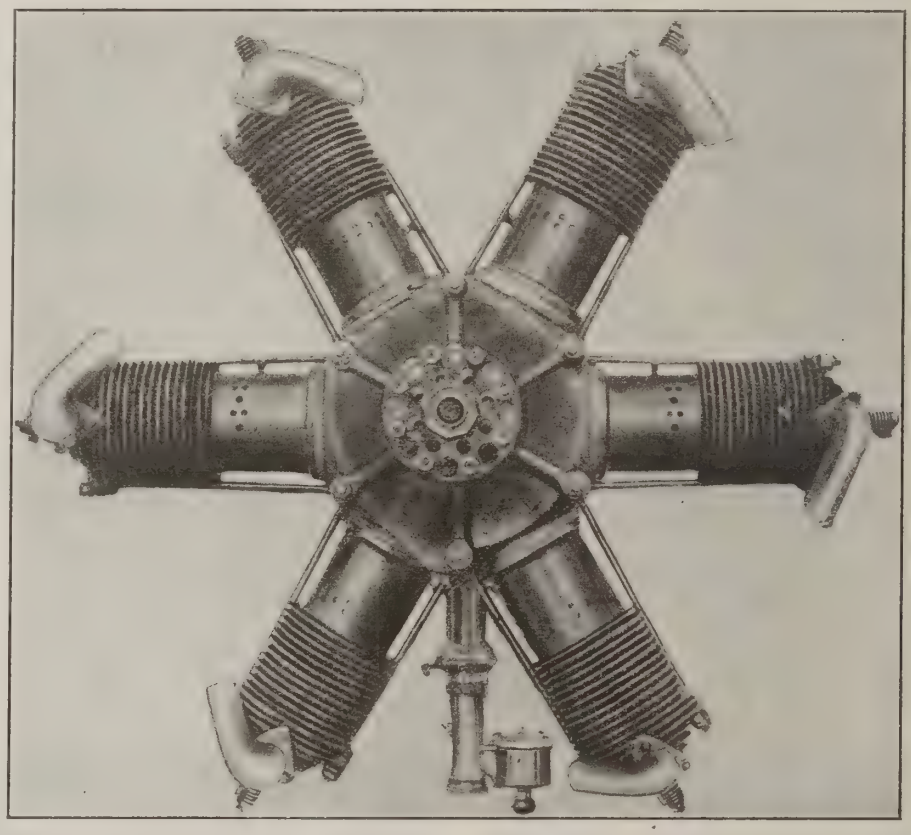
The cylinders are of a steel casting provided with small radiation fins for the aircooling. The pistons also have an iron foudation perforated at the lower part, with ends of the light material. Each group of three cylinders is coupled to one elbow of the crankshaft. The connecting rods, which are fastened to the piston by two bolts, are tubular in construction in order to reduce weight. The crank has two elbows, one for each group of the three cylinders. The crankshaft is supported in the crankcase by two large radial bearings, which extend through the crankcase to permit the fastening of the propeller. There are two valves for each cylinder, the intake which permits the drawing of the mixture from the carburetor automatically, and the exhaust valve which is operated by a valve lifter from the camshaft. The high tension magneto, which provides current with one spark plug in each cylinder, is fastened to the rear of the crankcase geared to the crankshaft. The lubrication is of the forced feed type; a two-pistoned pump located next to the magneto receives the oil from the tank and distributes it by means of a system of tubes to the upper part of the cylinders and to the combustion chamber. The oil is forced through the connecting rods and crankshaft. In addition to this automatic lubrication, an auxiliary hand pump within reach of the pilot permits the pumping of oil into the combustion chamber and supplements the lubrication and cooling of the engine.

The engine has the following specification:

Number of cylinders	6
Bore	115 mm.
Stroke	140 mm.
Weight of complete engine	147 kg. (324.079 lbs.)
Revolutions per minute	1,200
Nominal Horse Power	80
Horse Power in the altitude of Mexico	54
Consumption of fuel per horse power hour	325 gr. (11.375 oz.)

This engine has rendered invaluable assistance to the development of aviation in Mexico, and in aerial exhibitions the public has been able to judge its efficiency as an aeroplane engine. Experimentation is now being conducted in the shops on three new types of radial engines, of three, six and ten cylinders, from which it is hoped to obtain ever better performance.

In concluding this description a record of the principal proofs of the performance and efficiency of the engine is given; In Mexico, Pilot Martinez de Alba in his trial flight made a run of two hours, until his fuel was exhausted; and Martin del Campo made an altitude flight of 4,000 m. (13,123.36 ft.) above sea level in a Type "A" biplane. In Sonora, Pilot Riez Martinez made a flight with a passenger from Hermosillo to Ures and back in 2 hours and 20 minutes, having covered a distance of 200 km. (124.301 miles) over mountainous country. In addition to the record cited, practice flights are made with this engine daily, and formation flying for observation is performed over enemy territory.—Translated from *Tohtli.*



Propeller end of the Mexican Aztatl radial engine

Aerial Photography as an Aid to Forestry

A CANADIAN Air Service lieutenant, whose duties were in connection with the interpretation of photographs taken by observers on reconnaissance flights, points out in a Canadian forestry publication the immense value which aerial photography can be in the survey, appraisal and identification of unchartered forests.

Such amazing results were obtained with aerial photography during the latter part of the war, when cameras were developed to a high state of efficiency and photographers became more skilled in their art, that the application of this skill to the timber industry appears to have great possibilities. If carefully camouflaged enemy defensive works, concealed trench systems, hidden machine gun emplacements and gun pits, subterranean dugouts, wire entanglements and buried cable lines could be identified by skilled interpreters of aerial photos, there appears no good reason why the solution of the often difficult problem of identifying species of trees growing in unexplored country, difficult to explore on account of underbrush and lack of knowledge of the best natural routes and highways.

The military photographs with which such excellent results were obtained were taken from altitudes of 6,000 to 8,000 feet. They were taken under trying conditions in face of enemy aerial attack and anti-aircraft fire. Photographs taken from altitudes as low as 1,500 feet should reveal clearly details of terrain and species of trees growing on the tract under survey.

In the case of areas having a large variety of trees, a few pictures taken at a low altitude would be a valuable supplement to a photographic map or mosaic taken from a higher altitude, for it would serve as a means of identifying all the various species of trees, nature of under-

(*Continued on page* 407)

MAINTAINING CONSTANT PRESSURE BEFORE THE CARBURETORS OF AERO ENGINES REGARDLESS OF THE ALTITUDE

By LESLIE V. SPENCER, M.E.

Formerly Editor of Technical Publications, Experimental Department, Aeroplane Engineering Division, Bureau of Aircraft Production at the McCook Field, Dayton

(*Continued from last week*)

The Moss Turbo-Supercharger

IT has previously been brought out that the Sherbondy and Moss turbo-superchargers have few mechanical details in common, although both designs adhere to the same principles of operation. This is to be expected, in that both engineers worked entirely independently of one another. Therefore, neither device has a monopoly on all the good features; each has certain advantages that the other lacks, and in the final analysis it might be said that both are about on an equal footing as regards efficiency, when everything is taken into account.

Dr. Moss, in his development work, had back of him his experience and that of the General Electric Co., Lynn, Mass., with which he is connected, whereas Mr. Sherbondy performed his work independently. He was, however, assisted by the Fergus Motors of America, Newark, N. J., which concern did much of the accurate construction work under his direction, and by the De Laval Steam Turbine Co., Trenton, N. J., where preliminary steam tests of the Sherbondy outfit were made prior to any operative trials on the Liberty engine. On the other hand, all Moss experimental work was carried on by General Electric, including steam testing.

Like Mr. Sherbondy, Dr. Moss was specially fitted to conduct experimental and research work on exhaust gas turbines and direct-connected air compressors through wide experience with gas turbines in general. The General Electric Co. has carried on experimentation for a number of years under Dr. Moss' direction along this line, but the difficult nature of the gas turbine problem is brought out forcibly by the fact that to date this concern has not been able to perfect its turbine and compressor units to the point where it cares to put them on the market as a commercial proposition. It will be appreciated, therefore, that Dr. Moss was not striking out blindly along a new engineering path in designing a small turbo-compressor unit, but the new part was the producing of such a unit for the highly special service which it is called upon to perform in an aviation engine in connection with the Rateau system of supercharging.

As the illustrations show, the Moss turbo-supercharger incorporates the turbine rotor and the centrifugal compressor air impeller on the same shaft, and is arranged so as to leave the Liberty engine carburetors in the center of the V, connected to the air discharge of the compressor by an induction pipe of generous proportions which is rectangular in section. The engine exhausts are on the outside, and the gases are sent to the nozzle box of the turbine by means of substantial specially-designed exhaust headers which connect at their front ends to the flanges on either side of the nozzle box.

The very large size of the exhaust headers and the nozzle box is evident from the illustrations. By this design the exhaust gases are offered as unrestricted a passage in as direct a path as possible to the turbine buckets, so that the discharged gases from the engine should possess a large percentage of their outlet energy on reaching the point of expansion. This free passage feature should also have an effect upon the cooling of the device.

Unlike the Sherbondy machine, which has a circular nozzle plate, with nozzles all around the turbine wheel, the Moss nozzles are arranged in a semi-circular plate set into the front side of the nozzle box, as shown in the illustration. This should be a factor in keeping down the temperature of the rotor, since the intense exhaust gas heat is not being directed to the entire rotor all the time, but to only about one-half of its circumference.

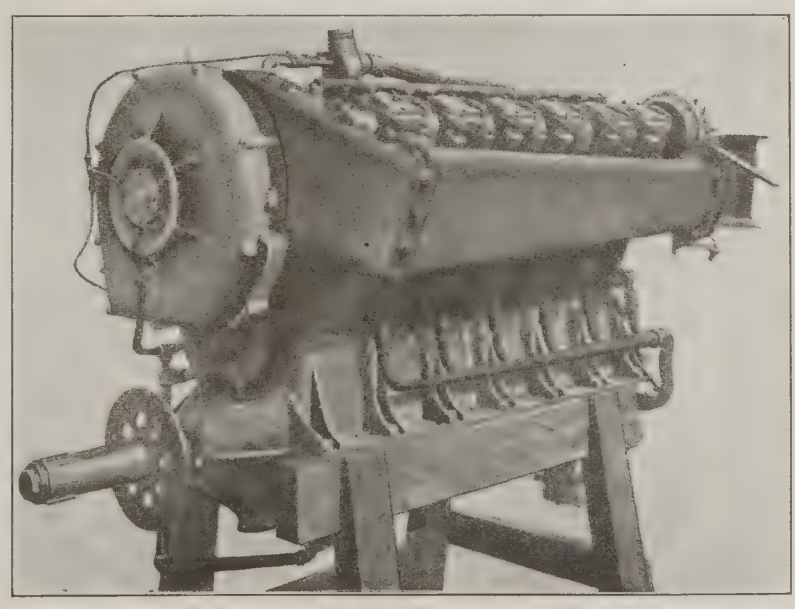
In further comparison between this machine and the Sherbondy final design, it is also to be noted that due to the turbine and compressor being practically separate so far as their housings are concerned, the Moss device is of greater fore and aft width than the Sherbondy. This was no doubt partially due to a desire to permit as much air circulation between the two parts as possible, for cooling reasons. The construction has the disadvantage, however, that the machine cannot be installed on the Liberty engine with the propeller in its normal position. To accommodate the depth of the Moss machine there has to be a special propeller flange and hub construction in order to bring the screw forward a small distance. In building his machine this way, it is evident that the designer considered the advantage of greater cooling sufficient to outweigh any disadvantage due to the necessity for alternating the propeller position to make room.

Instead of the air being drawn into the compressor through an opening in the front center, as with the Sherbondy machine, the Moss air intake is an integrally cast mouth that leads from the side of the housing to the compressor center at the rear and just ahead of the turbine, where the air is caught up by the blades of the impeller. This part is therefore in the reversed position from that of the Sherbondy impellers, the entrance side of the blades being toward the rear instead of to the front.

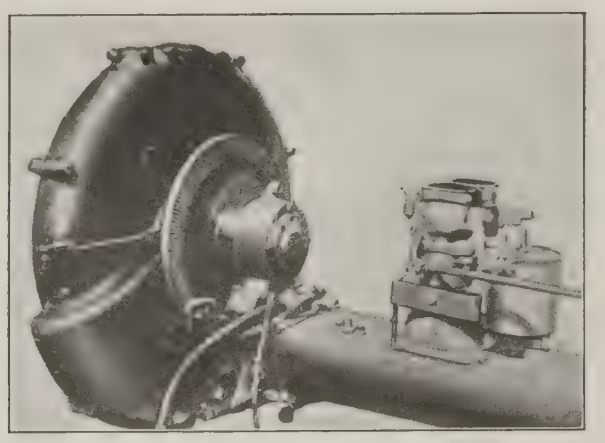
A feature of the Moss machine is the water-cooled rear bearing which shows clearly in one of the illustrations. This is nothing more or less than a special water jacket that surrounds the bearing proper, and through which water is circulated from the regular water circulation system of the engine. The machine also is provided with self-aligning bearings to take care of any slight inaccuracy of the position of the rotative parts due to the high speeds and high temperatures encountered in operation. There is also a thrust bearing to handle the thrust created by the action of the exhaust gas on the turbine blades.

In confirmation of the precautions taken in the design and the special features incorporated against overheating, the Moss apparatus has never given any appreciable overheating trouble in any operative tests yet conducted. The nozzles, which are subjected to the most severe heating conditions, have shown a slight red color after considerable running, but none of the other parts has become hot enough to reach a visible red. Undoubtedly the successful results obtained in this respect are due largely to the provision for free air circulation around the turbine and equally free method of exhaust. In the writer's opinion Dr. Moss has been entirely justified in claiming slightly more room at the front of his machine than is allowed by the normal position of the propeller of the Liberty engine, for this permits the design of the apparatus in such a way as to get about as good cooling effect as is possible in the necessarily limited space available. The matter of the heat dissipation is of premier importance in any development work of this nature.

In order to prevent the nozzle box and exhaust manifolds from getting out of shape due to the temperature and the pressure of the gas within, these chambers are internally braced by means of cross stays which are welded to the



Moss Supercharger Installed on Liberty Twelve



Rear of Moss Turbo-Supercharger

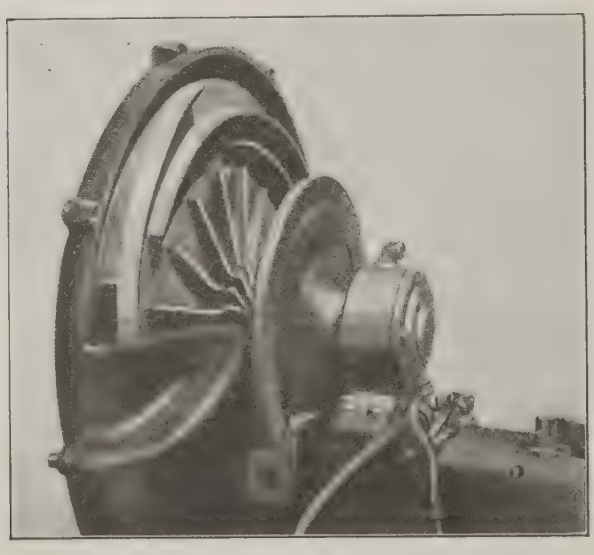
casings. This was found necessary due to the fact that the nozzle box must not be allowed to distort to any extent, and in order to maintain a good joint between the nozzle box and the manifold on either side the manifold must be made quite rigid without being heavy. The cross stays have proved a most satisfactory expedient.

Limitations and Future Possibilities of Supercharging

Of course, one of the first considerations in connection with the adding of any equipment or accessory to an aeroplane is whether or not the increased complication and additional weight which it entails are justified in the advantage gained. The turbo-supercharging system without question adds greatly to the complication of the powerplant of the plane, increases the number of things that can get out of order, and contributes some 200 to 300 pounds to the total weight of the ship. Unless automatically controlled, it also means one more unit for the pilot to handle, when he already has about as many things to control as one human being can possibly take care of.

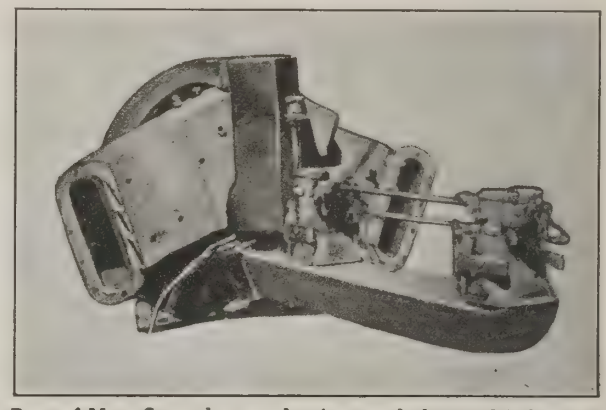
Further, due to the very high operating temperatures of the devices that have so far been designed (the temperatures range anywhere from 1,250 to 1,400 degrees Fahrenheit), there is an added fire risk where a supercharger is used, which is a factor of no small importance. To minimize danger from this source, it is impracticable to have the combustible parts of the fuselage—wood and fabric parts—very near the supercharger. This would ordinarily mean a wider fuselage than would otherwise be necessary.

Another thing that enters into the problem is the matter of the propeller. If the screw is designed to operate efficiently in conjunction with the plane at or near ground level, this same propeller will not be able to hold the engine down to proper speeds when in the less dense atmosphere at altitudes, if there is some form of supercharging apparatus maintaining the engine's power at approximately the same value as at ground level. It would be impossible to design a fixed-pitch propeller to operate efficiently with the supercharged engine; therefore when the supercharger is developed to the point where it is entirely practical for high altitude planes, we must also have adjustable pitch propellers so that as the height is increased the pitch of the screw can be changed to get the greatest advantage out of the supercharger boost. This, then, gets down to the fact that the supercharging apparatus must not only be charged with the added weight which it adds to itself, but it must also be considered as weighing whatever additional the variable pitch propeller figures as compared with the fixed-pitch type. Not only that, but there has not as yet been a successful type of variable pitch air screw developed, which means that this experimental work should be carried on along with the development of the supercharging system itself. The variable pitch propeller spells still more weight, further complication of the aeroplane, and last, but not least, another control level for the pilot to worry about.



Moss turbine wheel and water cooled rear bearing

Again, the supercharging system must be practically air-tight on both the induction side and the exhaust side. The apparatus cannot operate satisfactorily if there is any pressure leakage either where the induction pipe joins the air discharge of the compressor, or where the carburetor or carburetors attach to the intake pipe. At 20,000 feet, as an example, the pressure outside the induction pipe is about 7.5 pounds per square inch, whereas within the induction pipe the pressure is about twice this amount. The reason for tight joints is therefore obvious. In order to have as little pressure drop



Rear of Moss Supercharger showing nozzle box and induction system

on the exhaust side between the point of engine exhaust and the point where the pressure is utilized to drive the turbine rotor, it is also apparent that there must be no leakage around the joints of the cylinder exhaust passages to the exhaust manifold, or at the juncture of the manifold to the turbine nozzle box. Both of these conditions of tight joints are difficult of fulfillment under field service conditions, as will readily be appreciated, but by the use of special forms of gaskets and the application of red lead to the flange connections this difficulty has been largely overcome in the experimental work so far done. In making these connections on the exhaust side, it also has to be borne in mind that due to the high pressures and temperatures in maximum operation of the apparatus allowance must be made for expansion of the manifolds and gas casing, for otherwise these parts would soon warp and crack. Therefore, although tight joints are essential, there must also be a certain degree of flexibility to the exhaust assembly. Possibly some form of expansion joint might be devised which would allow for movement, while at the same time maintaining pressure-tight connections between cylinders and exhaust headers, and headers and turbine.

Use of a turbo-supercharger—or any supercharging apparatus, for that matter—of necessity means greater gasoline consumption. This at first thought might seem to be a serious objection, in that it would mean a lesser flight range for the supercharged plane. However, when it is considered that such a plane would, due to the constant power delivery regardless of the altitude, be capable of greater speed, and hence would cover more distance in a given time than the ordinary plane, the increased fuel consumption would be more than compensated for by the greater distance covered with each gallon of fuel.

Tests have shown that a Liberty engine on which a supercharger is installed uses anywhere from 10 to 15 per cent more fuel per horsepower-hour than does a standard Liberty engine, which on the average has a fuel consumption of about 0.504 pound per horsepower per hour.

Although the writer has no data on which to base such an opinion, it seems altogether likely that there would be some added trouble with the exhaust valves of a supercharged

engine, on account of the extremely high temperatures and pressures. This would no doubt mean the use of special material for these valves, otherwise they would be prone to excessive pitting, warping and burning, which would sooner or later affect the engine's power.

Up to a certain point, the fact that the compressed air would be heated above normal would have a tendency to promote efficient vaporization of the fuel. If the air attained too high a temperature, however, it would be detrimental to the mixture. The criterion of the amount of superheating of the air would be the temperature necessary to complete vaporization of the fuel. For the reason that in operation the temperature of the air sent to the carburetor by the compressor is often above that required for complete fuel vaporization, it has been found necessary in Europe to install some form of air-cooling device between the compressor and the carburetor to bring the air back to an efficient temperature. These air radiators have been either of the water-cooling type or merely atmospheric air coolers. The necessity for this auxiliary device has not been proven, however. It may not make enough difference in the practical operation of the supercharger to warrant its installation.

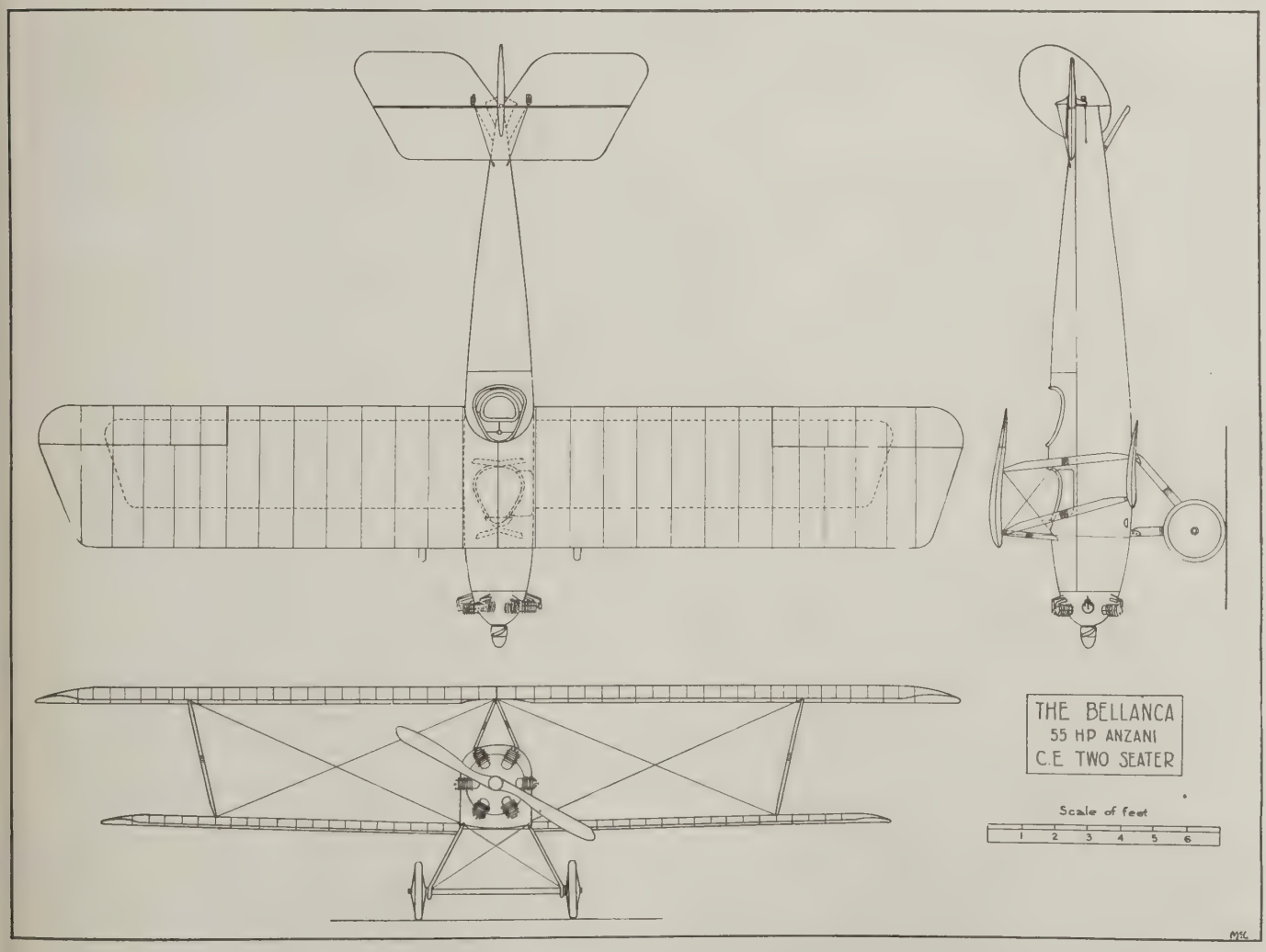
It takes anywhere from 5 to 10 per cent. of the engines delivered horsepower to drive the supercharger. Roughly, the engine without super-compression delivers only 60 per cent as much power at 15,000 feet as it does at ground level; at 20,000 feet, it can furnish but about 50 per cent as much as at the ground. Therefore, figuring the supercharger power at 10 per cent, the use of a supercharger means a horsepower recovery of 30 per cent at 15,000 feet, and a recuperation of 40 per cent at 20,000 feet. This serves to illustrate that the supercharging device is of increasing advantage as the altitude is increased, providing it performs its function of maintaining constant power delivery. It does not seem likely, however, that the Rateau principle can be utilized to advantage for operation at altitudes over 20,000 feet. At this height, the apparatus is rotating about as fast as possible within the safe limits of the available steels, and the operating temperatures are also about as high as known materials will withstand.

However, it seems that, when all is said and done, even though the supercharger were capable of operating efficiently only to 15,000 feet, it would be worth putting on an engine.

But, in the final analysis, supercharging is not intended for planes that are to be used for moderate altitude flying. It is of greatest advantage to the ship which is to be used for fast service at extreme levels. Flying steadily and on a straight course in the rarefied atmosphere of some 4 miles above the earth, the ship whose engine is able to develop the same power under these conditions that it delivers at the ground is destined to be the fast transportation plane of the future. With less resistance to its forward motion in this rarer atmosphere, yet with its power unaffected by this atmospheric condition, the future supercharged plane presents possibilities for speed that are unattainable as yet with any type of plane. With constant power, a propeller that will handle that power in the less dense atmosphere and with this advantage of lower resistance to forward motion, 200 miles an hour is almost within reach.

The long-range gun projects its missle up into the rarer atmosphere where the resistance to its travel is reduced. By this means its terrific speed is made the most of in covering seemingly impossible distances. So with the supercharged aeroplane of the future. Operating in a medium of less resistance, it can secure all the advantage of this rarer medium without its disadvantages.

The possibilities of development along this line, principally for long distance travel, are tremendous.



Scale drawings of the Bellanca Aeroplane described in the April 21st issue of Aerial Age

THE MANUFACTURE AND USE OF GLUES IN AEROPLANE CONSTRUCTION

By B. C. BOULTON, B. S., A. E.

THE development of a water-proof glue which should meet the necessary strength requirements and be thoroughly reliable has been one of the most important and difficult problems in our aeroplane program. At the close of 1917, the only glue that was accepted as satisfactory for the better grade of joint work was hide glue. And it did not possess any material water-proofing qualities, despite various attempts to make it water-resistant by the additon of certain chemicals, but had to be carefully protected from all moisture by several coats of varnish or shellac. Casein and blood-albumen glues were mentioned in a survey of various available glues, issued by the Forest Products Laboratory, in the fall of 1917, when they took up the study of aeroplane glues for the government. Both these, however, were still in the experimental stage, and were neither dependable, nor of sufficient strength. Since then the Laboratory has carried on extensive development work, and in testing has co-operated closely with various manufacturers throughout the country who have been engaged on this problem. Though the results were at first discouraging because of the severity of the deterioration tests required, yet within the last six months such progress has been made in the improvement of glue that it has been conclusively demonstrated that both casein and blood-albumen glues, when properly manufactured and applied, are equal in strength to all but the finest hid glues, are, for all practical purposes, waterproof, and are uniform and reliable. Casein glue, particularly, will be a very important, future factor, not alone in aeroplane construction, but in all high-grade joint work on which hide glues have heretofore been employed.

The present airticle treats each of the important glues in turn, briefly describing its nature and process of manufacture, and laying special stress on the mixing and application of the glue and the precautions to be observed to secure the best results. This article is based principally upon technical reports prepared for the Burea of Aircraft Production.

Classification of Glues

Glues may be divided into the folowing general groups: the so-called animal glues which include hide bone and sinew glues, blood-albumen, casein, fish and vegetable glues. The three animal glues are made from scraps of hide, green bones, and sinews of catle; blood-albumen glue from coagulated blood; casein glue from curdled milk; fish glue from fish offals, bladders and membranes; vegetable glues from certain plant growths and substances, such as cassava root, gums, and dextrines. A further important classification divides adhesives into true glues and cements: the former on setting merely give up their excess water and do not undergo any permanent chemical change; while the latter, not only lose their excess water, but alter their chemical nature by changes that cannot be reversed. This distinction further classifies glues as non-waterproof and waterproof, respectively. Glues may again be differentiated, according to their nature and the methods used in their application, as solid or liquid glues, and hot or cold glues.

Animal Glues

Physical and Chemical Nature: Glue is the first product of the hydrolysis of animal connective and elastic tissues. (Hydrolysis is a chemical reaction that occurs between a salt and water, in which the water is decomposed and an acid and a base, or an acid and a basic salt are formed.) When heated with water, these tissues lose their peculiar structure, swell and finally dissolve. Upon cooling, this solution jellies, and dries into a horny, translucent mass, of a color, varying with the purity of the stock, from pale yellow to dark brown. This dry glue will redissolve in hot water and the solution possesses strong adhesive qualities. No essential difference exists between glue and commercial gelatin, so extensively used in the preparation of foods and drugs. The latter, being more carefully made from selected stocks, is of lighter color and contains fewer impurities. These impurities consist of slight amounts of mineral matter, and sometimes, grease, free acid, alkali, odoriferous substances, and certain nitrogenous materials grouped under the name of "non-glue." Of these mucin, an impurity present in the original glue stock that should be removed by the preliminary treatment of the stock, is thought to be the cause of the "foaming" of glue. In addition to mucin, the non-glue contains nitrogenous decomposition products, produced by the hydrolysis that occurs when glue is subjected to prolonged heating. None of these substances possess any adhesive qualities. The formation of such products is the explanation of the rapid deterioration in the strength of overheated glue. Both gelatin and glue swell in cold water, but do not dissolve until the water is heated. Their difference in adhesive power and their similarity in chemical and physical nature are difficult to account for. Glue contains two essential constituents: glutin, an amorphous, odorless, tasteless, protein substance, soluble in water and of great adhesive strength; and chondrin, similar to glutin, but derived largely from cartilaginous and young bone tissues, and not equal to glutin in binding power. Chondrin, though not having as great gelatinizing properties as gelatin, is much more viscous and adhesive. Glutin is more abundant in hide glues; chondrin in bone glues, a fact that accounts for the superiority of the former class of glues.

Manufacture of Hide Glue: Clippings from the hide, also the tail, ear and head pieces form the bulk of the raw material used for hide glue. No tanned skin or parts that have begun to spoil can be utilized. Briefly summarized, the process of glue making from either hide, bone, or sinew consists of three steps: first, washing the stock and treating it with lime to remove extraneous material (with bone stock, the material, after being washed, is usually crushed and extracted with dilute acid before it is limed); next, boiling the stock to convert the glue-forming substances into a glue solution which is concentrated, and then jellied by cooling; lastly, slicing, and drying this jelly to form dry, cake glue. Though the process, as outlined, is very simple, and variation in the many factors involved produces marked differences in the glue.

A somewhat more detailed description of the manufacture is as folows: the glue stock, wet, or dried and salted, is washed, and then steeped for several weeks in milk or lime in wooden vats or cement pits. Frequent stirring of the material with long, forked sticks is necessary. The mass swells, and the fats are converted into lime soap, while the hair flesh, and blood are separated from the hide and partly dissolved. The stock is now thoroughly washed in tubs with mechanical stirrers to remove all lime, lime soap, and dirt. Dilute hydrochloric, or better sulphuric acid that both plumps and bleaches the stock, is used.to remove the last trace of lime. After any excess of acid has been washed away, and the water dried or pressed out, the material is ready for cooking to change the collagen into glue. During this process the time and temperature must be carefully watched, since long continued cooking or actually boiling lower the quality of the glue. Grease, and lime soaps rise and are skimmed off. Solid matter (hair, dirt, etc.) sinks, and the liquor is drawn off through it. As all the stock is not dissolved in the first liquor, it is cooked several times more in fresh waters to extract all the glue. The first run yields the best glue. Usually, all the liquors are mixed to secure uniformity. Open vats, heated by steam coils, are generally used in this rendering process.

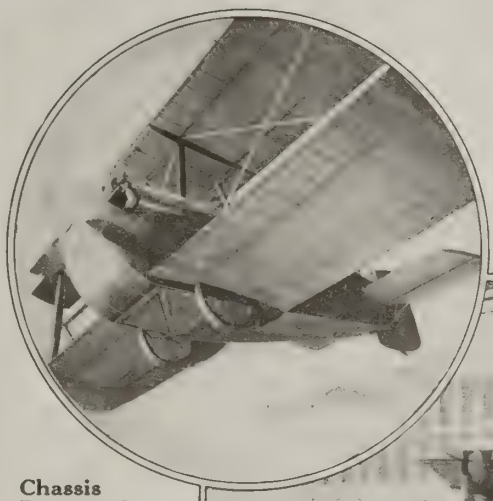
Should the liquor be too thin to jelly, it is concentrated in vacuum pans, then run into coolers, relatively small, galvanized iron vessels and chilled by refrigeration at 32° F. In 12 to 24 hours the solution jells. It is now turned out on a table, cut into slices ⅛" to ¼" thick by tight wires in a frame, and the slices placed in single layers on wire frames that are run into drying rooms from which sunlight is excluded. During this drying period the glue must be carefully watched, for it is either very apt to mould or liquefy through bacterial action in too low temperatures or, if the temperature rises above 95°-105° F., it is liable to melt. But in clear, cold weather, owing to the low humidity, the temperature in the drying room may rise to 110° F. In the summer, very little glue is made owing to the impossibility of drying the films. Should wet glue be frozen and afterwards dried, it becomes spongy and porous. One day is required for drying, and then the films are ready to be broken or ground in a disintegrator.

Manufacture of Bone Glue: Fresh, green bones are the raw material for bone glue, which is very similar to hide glue. The bones are first sorted, then passed through a mill which cracks them slightly, and from there taken to the extracting plant for the removal of fat. This operation may be performed by open boiling, by digestion with steam at 40 pounds pressure, or by extraction with solvents. The last method is in general use because it is most efficacious. Boiling leaves a good deal of fat in the bones, and the second method removes, not only the fat, but also a large portion of the glue-yielding substances. Benzine is the most common solvent. After extraction, the

(*Continued on page* 395)

EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

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Chassis Retracted



First Shock Absorbing Rudder



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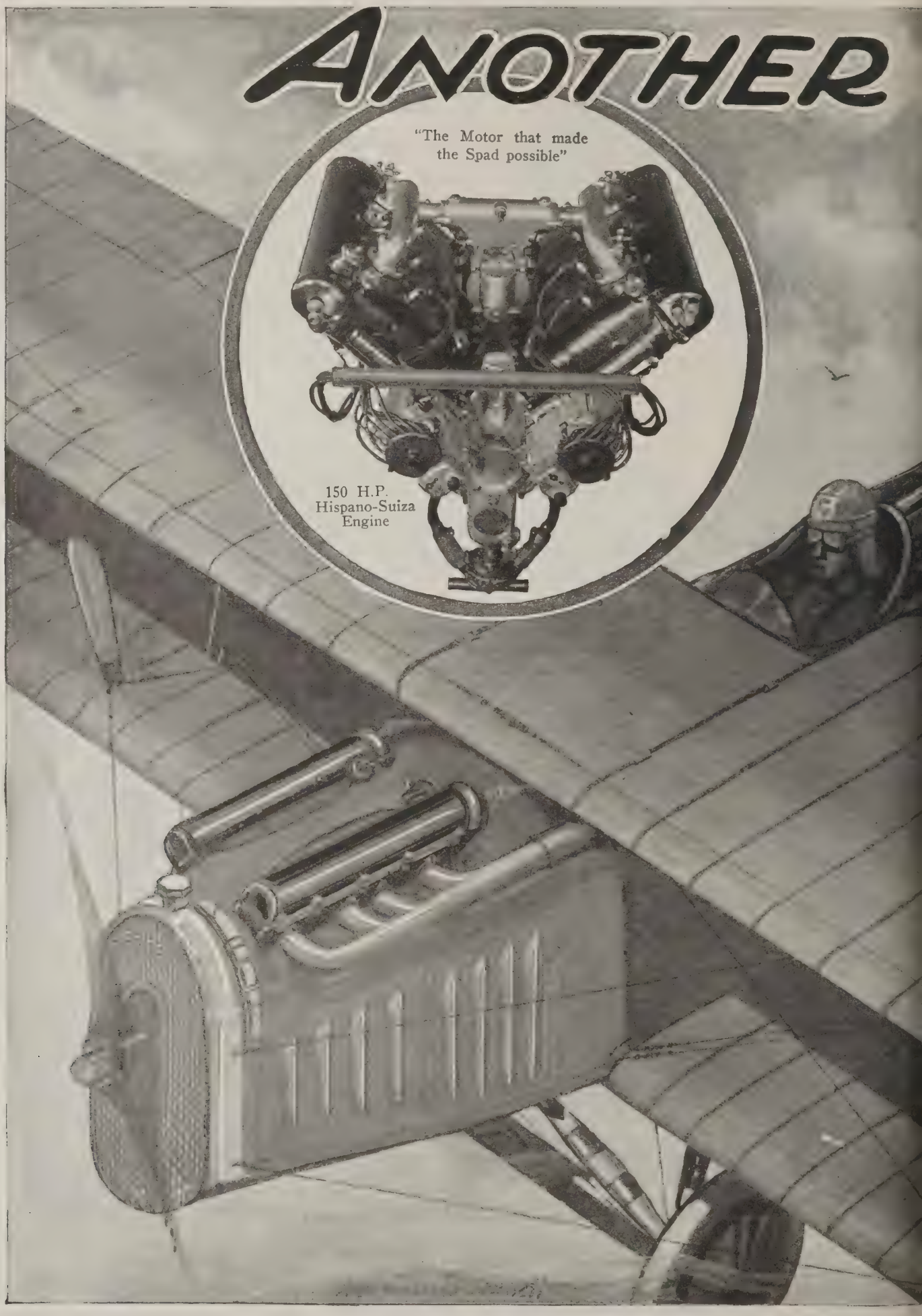
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ANOTHER
"The Motor that made the Spad possible"
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RECORD!



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MAIL PLANE MAKES RECORD.

111 Miles an Hour Averaged Between Capital and New York.

WASHINGTON, April 11.—A record flight for an airplane equipped with a 150 horse-power Hispano-Suiza motor, was reported to have been made to-day by Pilot Leon D. Smith of the postal aerial mail service in a flight from Washington to New York. Carrying 157 pounds of mail matter in addition to a full load of gasolene, an average of 111 miles an hour was maintained for the entire distance of 218 miles.

The flight was made in one hour and fifty-eight minutes, the time from Washington to Philadelphia, 128 miles, being one hour and eleven minutes and from Philadelphia to Belmont Park, New York, forty-seven minutes.

N.Y. Sun
April 11th, 1919

Manufactured by

Wright-Martin
Aircraft Corporation
New Brunswick, N. J.

HOME!

The boys are home!

A year and more ago they marched away and left their homes and happiness and friends behind to go to France to fight for us. They fought—they won—and now they're home again.

They've done their part, those boys of ours—they saw it through.

And we who crowd the curb and wave our hats and cheer to let them know we're glad—how about us?

We bought Liberty Bonds to put up the money to buy the guns those fellows fought with. They're proud of us.

They know we backed them to our limit while they were "over there."

But our work isn't over.

We can't let the job those boys have done in France go unfinished.

We've got to see it through.

We've got to raise the money to make sure of the Victory they've won and bring the rest of our soldiers back.

The Victory Liberty Loan is coming—Let's see it through!

FINISH THE JOB

GOVERNMENT LOAN ORGANIZATION
Second Federal Reserve District
LIBERTY LOAN COMMITTEE
120 Broadway - - - - New York

This space has been donated by Aerial Age Weekly

(*Continued from page* 390)

next step is treatment with dilute hydrochloric acid (sp. gr. 1.05) to dissolve the calcium phosphates and carbonates. The cartilaginous material is now washed with lime water to remove any acid. When the washing is completed the mass is boiled in water or steamed in a digester until dissolved. Any grease that forms is skimmed or filtered off. The glue liquor is then run into shallow vats where it is clarified by the addition of alum. After ten minutes boiling it is allowed to settle, before being drawn off into cooling vessels, refrigerated and dried as previously described. Frequently, for the lower-grade glues, benzine-extracted bones are directly boiled or steamed without the removal of the dirt and grease. After the glue solution is sufficiently concentrated it is strained through cloth, bleached by sulphurous acid, and evaporated at 140° F. in vacuo, or in open troughs with half-submerged steam coils.

The process used in making sinew glue is very like that for hide glue.

Fish glue is made by boiling, at 230° F., fish heads, tails and fins. Since it has very weak jelling properties, it is ordinarily made into liquid glue. The offensive odor of this glue is destroyed by creosote or oil of sassafras.

Either fish or animal glues can be made into liquid glues by treatment with acetic, nitric, or hydrochloric acids, a process by which their power of gelatinizing is lost. The adhesiveness of such a glue is not materially changed, and it does not require heating.

Preparation and Use of Animal Glues: Very frequently a high-grade glue will give very poor results, simply because it has been misused in some way. It is therefore necessary to emphasize strongly that with all glues, for the highest grade work, precautions and directions given in the discussion of the mixing and application of a glue should be followed both strictly and intelligently. On unimportant work a reasonable degree of latitude is permissible.

The required amounts of glue and cold water must be weighed out in the proportions that have been previously determined for that particular glue, as described later in the specifications. If the glue is in the form of cakes, flakes, or ribbons it should be broken up into small pieces about the size of peas and soaked, in a covered vessel with the proper amount of cold water, until every particle is thoroughly softened. Occasional stirring is necessary to insure the water's reaching every bit of glue, for if any lumps remain hard the prolonged heating, necessary to melt them, seriously lowers the quality of the glue. Even for powdered glue, the time of soaking must be at least two hours.

The softened glue is transferred to water-jacketed glue pots in which it is melted as quickly as possible without overheating. The best working temperature of the glue is 140° F., never above 150° F. The glue pots should be kept covered, when not in actual and continuous use, to prevent the escape of water from the glue and the formation of a surface scum. Any scum that may form must be removed. Never melt glue over an open flame or by the injection of live steam, because the local overheating injures the glue strength. Glue which has been heated for eight hours or longer must not be used. Likewise, any glue that has been heated at any time, on any day, must be rejected and not used again. The glue solution, once it has been heated, should never be allowed to cool, for re-heated glue has not the same tenacity as a fresh solution.

The room in which hot glues are applied should be free from drafts, and as warm as healthful working conditions will permit. The wood should be uniformly dry, and at least as warm as the room to prevent a sudden chilling and setting of the glue. The wood should, however, not be heated to too high a temperature, since hot wood readily absorbs moisture from the glue, leaving it dry, and thereby lowering its elasticity. The wood surface should "fit" perfectly, be lightly toothed with a fine toothing plane, and be clean. The glue must be applied to both surfaces of the joint, and spread freely and as rapidly as is consistent with good workmanship. Special care must be exercised to avoid the formation of air bubbles in the joint, which break the continuity of the glue film. These are due to carelessness in applying the glue or to foaming and frothing of the glue. Pressure should be applied quickly to prevent premature jellin or setting of the glue. A sufficient number of clamps must be used to distribute this pressure evenly over the entire joint that the surfaces may be in close contact at all points. The intensity of the pressure should be about 150 lbs. per sq. in. From 5 to 12 hours, depending on the character of the work, must elapse before the clamps are removed, and not for 24 hours may any sudden strain be put upon the joint. If the glued surface is very large, or if there are many laminas of wood, provision should be made for properly drying the wood. In the case of all hot glues, particularly, care must be used in maintaining sanitary conditions in the mixing room and glue room; all glue pots, containers, and brushes must be washed at the close of each day's work; all scraps of glue about the floors and tables must be removed. Unless these precautions are rigidly observed fresh glue is liable to infection by bacteria which seriously impair its quality. Good glue has a clean odor. Decomposed glue must be rejected.

Hide glue of good quality, in spite of certain disadvantages, is recognized as being superior in strength to any other animal or vegetable glue. It is, therefore, used for propeller and all other high-grade joint work. Because of its lack of waterproofness it must be thoroughly protected by varnish or shellac. Bone and sinew glues find use in less important work; vegetable glues are extensively used for furniture; fish and other liquid glues where strength or reliability are less necessary.

Egg and Blood Albumen

Chemical Nature: The white of an egg is called albumen, and its chief constituent is what is known chemically as albumin, a viscous, nitrogenous substance, similar to the albumin of blood serum. Egg albumen is made up of 84.0% water, 11.9% albumen, 3.6% fat, etc., and 5% ash. (In further discussion the general term albumen will be used to mean albumin.) Albumens combine with both acids and bases to form acidic or basic salts, albuminates. With water they form perfectly clear, odorless solutions.

Manufacture of Egg Albumen: Eggs are broken and the whites carefully separated from the yolks. To obtain the clear albumen the whites are strained through silk gauze lining the drum of a centrifugal machine, and allowed to settle for 30-40 hours. (The drums of this machine must be lead lined to prevent chemical action.) An alternative method of clearing the albumen is to cool it in iron vessels for 5-6 days at a low temperature, a little tannic or acetic acid is sometimes used in the clarification. The clear albumen is dried as rapidly as possible in a stream of dry air or in vacuo under 120° F. (above this temperature the albumen turns yellow). Within 4-6 hours this process is completed, and the albumen is obtained in the form of thin, clear, elastic sheets. About 100-125 eggs are required to yield a pound of the dry albumen.

The methods of producing blood albumen are very similar to those just described. Fresh blood from cattle is spread in shallow dishes and a separation occurs between the fibrin of the blood and the pale yellow serum. After this is complete, the serum is strained through silk gauze lining the drum of a centrifugal machine. As with the egg albumen it is allowed to setle 30-40 hours, when the albumen should be quite clear. It is then dried in the manner outlined above, and forms flakes, varying in color from gray to black according to the purity. The purest is of a grayish yellow color. The blood from one cow will yield slightly less than a pound of the dry albumen.

A very pure albumen is obtained by forcing the serum through charcoal filters and precipitating the albumen by basic lead acetate. After washing, the precipitated lead albuminate is decomposed by carbonic acid and the lead removed by sulphuretted hydrogen. The albumen is then filtered and dried as before.

Albumen Glues

Preparation: Formulae for the preparation of these glues are still kept secret, both by the trade and the laboratories working on glue development. The dried albumen of course forms the chief constituent and to it are added amonia and lime. In preparing the glue the dry albumen is soaked for about 1½ hours, and then stirred in a glue mixer for a few moments. Amonia is added, the mixture again stirred a short time, and the lime in dry form slowly introduced while the stirring continues at low speed. After standing about an hour the glue is carefully poured from under any scum that may have formed on the top and is ready for use.

Application: Albumen glues must be applied hot, and the precautions necessary with all hot glues have to be observed. The room should be warm and free from drafts, and the wood surfaces at room temperature or above. A machine spreader is used in applying the glue, and special hot presses are required for pressing and drying the glued parts. A considerable degree of care and skill is necessary for satisfactory results. Attention should be called to the very deleterious effects of foaming with albumen glues. Foaming is largely due to the air that is ground into the glue by the spreader. With extra thick spreads of glue the pockets of air formed during the pressing are larger than with thin spreads. Wherever such a pocket occurs there is no contact between the faces of the joint. Foaming seriously impairs the strength and waterproofing properties of albumen glues.

Like casein glue, albumen glues are not glues within the strict meaning of the term but are cements; that is, upon setting their hardening is due, not merely to the evaporation of water in the glue, but to changes in their chemical composition. The presence of water will not, as in the case of animal glues, cause them to soften after setting has once taken place,

because the chemical changes that have occurred cannot be reversed. Albumen glues are therefore practically waterproof when properly mixed and applied. They are also very strong, even superior to hide and casein glues under the best conditions, but because of the care that must be used in their application albumen glues are not so reliable as other types. Their chief use is in the manufacture of plywood. Blood albumen glue is much more widely used than egg albumen since it is less expensive.

Casein

Chemical Nature: Casein, the chief constituent of casein glue exists in fresh milk, in a state of suspension, as colloid, and is so finely divided that it can be separated by filtration only with great difficulty. Eighty-five per cent of the protein of milk consists of this substance. What is called casein of milk appears to be a compound of casein with lime that may be regarded as generally a weak acid. Casein can be obtained from milk in two ways: by treating the milk with an acid, or by curdling it with rennet. When milk is acted upon by an acid the lime casein compound is split up, and paracasein is precipitated in the form of curd. Casein combines with strong acids, acting in their presence like a weak base. In the curdling of milk by rennet, first the enzyme of rennet splits the lime casein into paracasein, the curd, and whey albumin, then coagulation follows if lime salts are present. "Self soured" or "natural sour" casein is similar to that produced by an acid. Milk is spontaneously soured by lactic acid, produced by the action of lactic acid bacteria on milk sugar. Considerable differences in physical and chemical properties exist between acid and rennet precipitated curd. The former does not contain any lime salts because these are all dissolved by the acid. The rennet curd is more elastic and is not sticky.

Reference to the government specifications on casein, given later, show the general proportions of some of the constituents. The percentages of the elements present in cow milk casein, from analysis of a pure sample, are as follows:

Carbon	52.9 %
Oxygen	22.8 %
Nitrogen	15.6 %
Hydrogen	7.0 %
Phosphorus	.85%
Sulphur	.77%

Manufacture of Industrial Casein: As indicated above there are two general methods for the precipitation of paracasein: the first and more important is the acid, or natural sour process; the second the rennet process. This latter method has not been approved by the government. Acid curd is precipitated from the skimmed milk by lactic acid, or by either dilute sulphuric or hydrochloric acids. The yellowish precipitant is redissolved in alkali (sodium bicarbonate) and reprecipitated with diute acetic acid. The curd then is well washed and pressed, after which it is stirred to pulp with water (100 parts curd to 50 parts water). When this operation is completed it is steamed or cooked 25-30 minutes in a wooden vat with about 150 pars of a 1% solution of soda to remove the lactic acid and butter fat. Upon heating, the mass forms a thin, milky fluid which is transferred to a separate vessel to cool and there precipitated by dilute nitric acid. The casein collects at the bottom; the supernatant liquor is drawn off; and the casein is rinsed with water. The casein is allowed to settle in the water which is then very gently poured off. This operation is repeated until the wash water is neutral, when the casein is drained on filter cloths, pressed, and dried on trays in drying chambers at 120°-140° F. One hundred parts curd yield 45 parts of purified casein, free from lactic acid and butter fat. If the procedure just outlined is carefully followed, no trouble should be encountered in meeting the government requirements as to acidity, or fat and moisture contents.

Casein Glue

Chemical Nature: In all the various formulae used in the preparation of this glue the main constituents are casein, lime and sodium silicate. In the presence of water the alkali reacts with the casein to form new compounds. The water-proofness of casein glue is due to the fact that after the glue has once set the chemical changes which occur during the mixing and setting cannot be reversed. From the analyses (made by the Chemical War Service Laboratory) of two typical casein glues, can be obtained an idea of the various constituents and their relative proportions.

	Le Grandville Glue	C. W. S. Laboratory Glue
Casein	36.00	44.65
Calcium hydroxide	23.80	27.90
Sodium silicate	17.00	14.85
Gum arabic	5.50	7.55
Moisture	5.30	5.05
Calcium carbonate	8.00	
Ammonia (free)	1.25	
Iron, aluminum, magnesium (as oxides)	1.50	
Undetermined	1.65	
	100.00	100.00

The "Le Grandville" glue was a new, French, propeller glue; the C. W. S. L. glue, one that was developed by the Laboratory as an equivalent of the French glue. The casein used in the Laboratory glue was designated as "self-soured", "extra-fine" casein, and the lime was technically pure.

Since the special methods of manufacture of casein glue as well as the formulae employed are still trade secrets, the procedure followed by this Laboratory is of interest. One pint of gum arabic was dissolved in five pints of 40% commercial water-glass (sodium silicate) and evaporated over a water bath till dry enough to grind. After grinding to 50 mesh, the silicate gum-arabic mixture was thoroughly mixed with calcium hydroxide of 150 mesh size and casein of 40 mesh size in the following proportions: casein 40, alkali 25, gum mixture 20. This mixture dissolves readily in cold water, more easily in fact than the "Le Grandville" glue and furthermore it does not "gel" as quickly as the latter. The amount of water added to the mixture was 10 parts (by weight) of dry glue to 22 parts water.

(To be concluded)

UNIVERSITY OF WASHINGTON ANNOUNCES AERONAUTIC COURSE

IF present plans materialize, the University of Washington will this fall offer a complete course in aeronautical engineering. The tentative curriculum proposed by Mr. J. W. Miller, who has charge of the work, is as follows:

First Quarter—Algebra, 3; engine problems, 3; general chemistry, 5; drawing, 3; woodwork, 1; military science, 2.

Second Quarter—Trigonometry, 3; engine problems, 3; general chemistry, 5; drawing, 3; woodwork, 1; military science, 2.

Third Quarter—Analytic geometry, 3; engine problems, 3; general chemistry, 5; aerodynamics, 3; woodwork, 1; military science, 2.

First Quarter — Calculus, 3; aerodynamics, 3; physics, 5; machine design, 3; metal work, 1; military science, 2.

Second Quarter—Calculus, 3; English, 3; physics, 5; machine design, 3; metal work, 1; military science, 2.

Third Quarter—Aerostatics, 5; English, 3; steam engines, 3; steam laboratory, 3; metal work, 1; military science, 2.

First Quarter—Mechanics, 3; aeroplane design, 5; flying boat design, 5; direct current (EE), 4.

Second Quarter—Mechanics, 3; aeroplane design, 3; dirigible design, 3; alternating current (EE), 4; elective, 3.

Third Quarter—Structure of metals, 3; aeroplane metals, 2; aerial properties, 5; transportation, 3; elective, 3.

First Quarter—Business law, 3; thermodynamics, 3; organic chemistry, 5; aerial properties, 2; elective, 3.

Second Quarter—Gas engines, 3; aerial maps, 2; organic chemistry, 5; elective, 5.

Third Quarter—Aeronautical engines, 2; ignition system, 2; organic chemistry, 5; thesis, 3; elective, 3.

At the present time no department of aeronautics has been authorized by the university, but the above curriculum indicates the probable outline of the course. Changing methods of aeroplane construction will from time to time cause changes in the course, dropping those subjects no longer having a bearing on aeroplane building. Thus organic chemistry is included, as it includes investigations in dopes and fabrics used in present day construction. Should some other methods of construction supersede the present method, this subject would be eliminated from the curriculum.

The new Boeing Aerodynamic Laboratory will be utilized in this work. This wind channel was the gift of W. E. Boeing to the University of Washington. The channel proper is similar to those so successfully used at the Massachusetts Institution of Technology, the testing laboratory of the Curtiss Aeroplane and Motor Corporation, and the National Physical Laboratory at Teddington, England. As aeroplane designers are largely dependent on the results of these model tests in wind channels, it will be readily appreciated that the university's laboratory will be of utmost value to aeroplane builders. Much research work will be conducted, which, it is hoped, will make possible a higher standard of efficiency in aircraft.

AEROPLANE RADIO TELEPHONE APPARATUS

BY EDGAR H. FELIX, A., I. R. E.,
FORMERLY RADIO ENGINEER, SIGNAL CORPS

THE general attention which has been recently given the radio telephone by the general public, particularly since the demonstrations of the device at the Aeronautical Exposition and elsewhere, has led to a desire for an understanding of the operating principles of modern radiophone apparatus.

At the Exposition, the incoming signals were amplified through loud-speaking megaphones, and hundreds of persons were given the opportunity of listening to radio telephone conversation between the demonstration booth, aeroplanes and dirigibles in flight, submarines and battleships in New York harbor and nearby land stations. It was possible to visualize the application of these devices aboard aircraft and submarines, making conversation possible under all conditions. The particular type of loud-speaking outfits referred to above had been installed on submarine chasers, the loud-speaking receiver being mounted on the bridge, and the speaking microphone attached to a flexible cord. It was thereby possible for captains on cooperating submarine chasers to confer while closing in on enemy "subs," their words being amplified far above the noise of the motors, the straining of the ship and the howl of the wind.

Those who were privileged to witness the voice-commanded flying conducted on the roof, the planes circling overhead, quickly and efficiently obeying the commands of those below, with the precision of a well-trained company of infantry on the drill field, could easily imagine the advantage voice-commanded combat squadrons had over an unco-ordinated enemy. The installation used is shown in Fig. 2. As Captain Rickenbacker watched the planes, he recounted several instances occurring in his own personal experience where a ground observer with radio telephone equipment could have warned the aviator above of danger—an enemy plane, for instance, diving from above—in time to have made unnecessary the supreme sacrifice.

The power of concerted action, subject to constant modification in accordance with the exigencies of combat which the radiophone gives a squadron operating against an enemy, makes it infinitely more potent than a squadron which must depend upon the initiative of the individual aviator and his ability to carry out a plan of action against the enemy without recourse to any system of intercommunication with the other members of his squadron.

The Figs. 3 and 6 show various types of microphones, headgear and generators developed by the Signal Corps for aeroplane radio telephony. This work was conducted by the

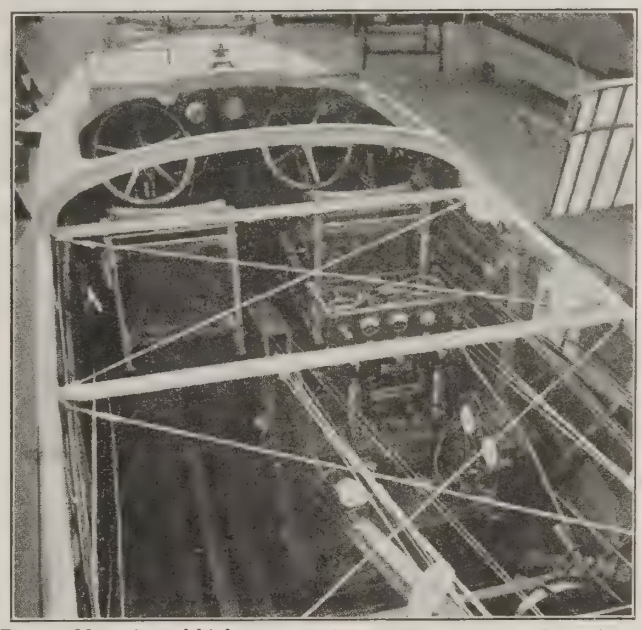


Fig. 1—Mounting of high power radio telephone set in a flying boat, showing small space required

Radio Development Section, of which Lieutenant-Colonel Nugent H. Slaughter was Officer-in-Charge, and Colonel C. C. Culver was liaison officer for the Air Service. The aeroplane radio telephone outfit which had most extended application during the war, was that type known as SCR-68, the letters SCR signifying Signal Corps Radio. This set consists of three units adapted to easy mounting on the plane. The helmets, mouthpieces and generators used are illustrated, and as well the transmitting and receiving apparatus mounted on the plane.

The power developed by the windmill driven generator is applied to the "vacuum tubes," the generators of the high frequency sustained oscillations which make radio telephony possible. The successful application of vacuum tubes to this purpose has been the greatest step in advance in the perfection

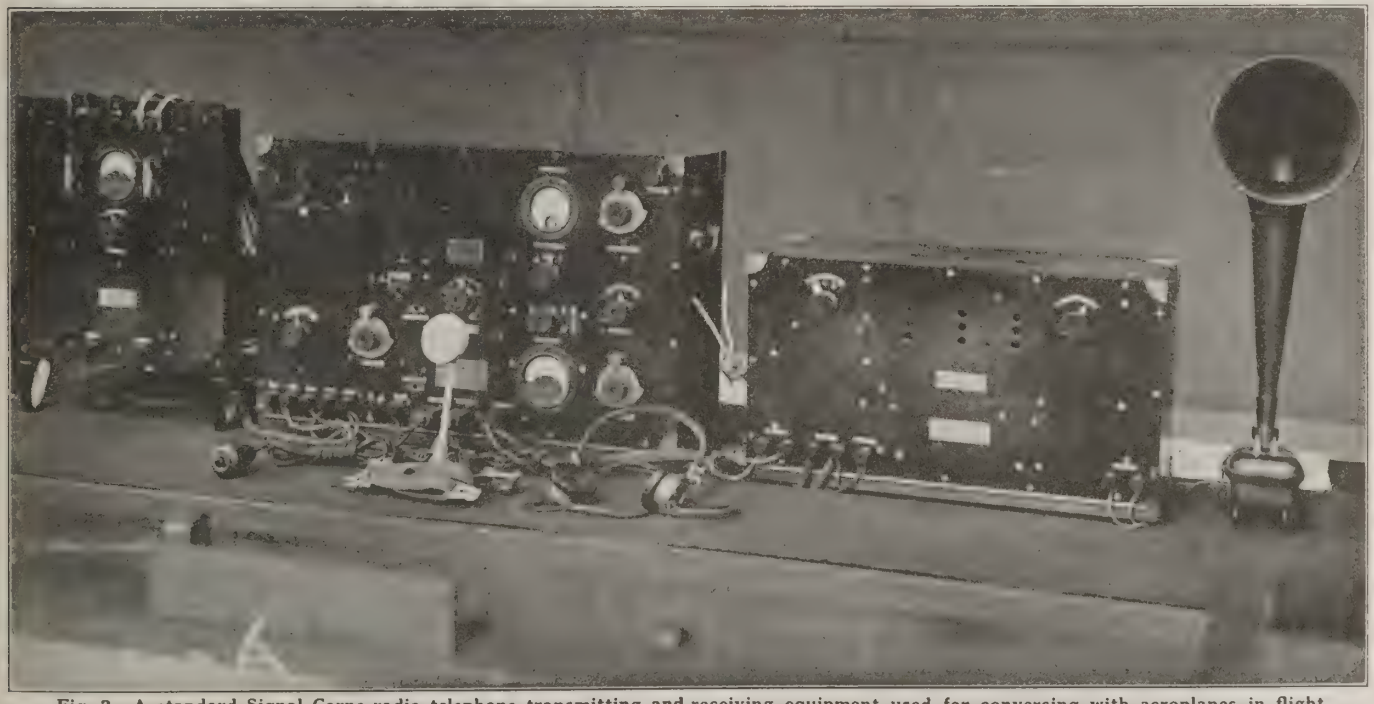


Fig. 2—A standard Signal Corps radio telephone transmitting and receiving equipment used for conversing with aeroplanes in flight



Fig. 3—The radio receivers are incorporated in the helmet and are also connected to the interphone between pilot and observer. The transmitter is strapped on the breast

of radio telephone apparatus of the last decade. Let us consider the principle of operation of the vacuum tube.

It has long been observed that if a plate of nickel or other conductor be inserted in an incandescent bulb, as shown in Fig. 4, which is highly evacuated, and if the potential of this plate be raised above the potential of the filament by means of a battery, a stream of electrons, constituting an electric current, will flow from the filament to the plate. It was also observed that current could be made to pass from the filament to the plate, but not from the plate to the filament. This effect has been utilized for the rectification of high freqency alternations, and is considerably more efficient as a rectifier of radio signals than the minerals, such as galena, silicon and carborundum.

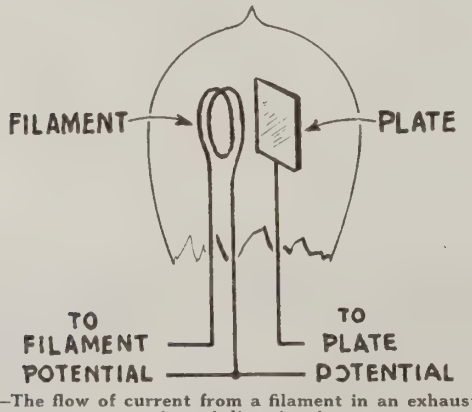


Fig. 4—The flow of current from a filament in an exhausted bulb is uni-directional

The quantity of electrons radiated from the filament is dependent on its length and the brilliancy to which it is lit. If the potential to which the plate is raised is sufficient, all the electrons radiated from the filament will flow to the plate. In practice, however, the plate potential is maintained at less than "saturation" voltage, as the voltage at which all the electrons flow to the plate is termed. The result is that a "space" charge accumulates between the filament and the plate, which opposes and chokes off the flow of electrons to the plate as soon as it grows to sufficient magnitude.

In order to overcome the space charge, a "grid," consisting of three or four small zig-zag platinum-coated wires, is introduced between the filament and plate. This is shown diagramatically in Fig. 5.

Let us consider the effect of applying an alternating current on this plate. As the charge on the grid increases, it is assisting the accumulation of the space charge, thus choking off the plate current. Now, as the alternation reverses, the space charge is neutralized, and the plate current increases, as shown by the accompanying curves in Fig. 10.

The result is that the alternations on the grid are reproduced in greatly amplified form in the plate circuit. Considerable

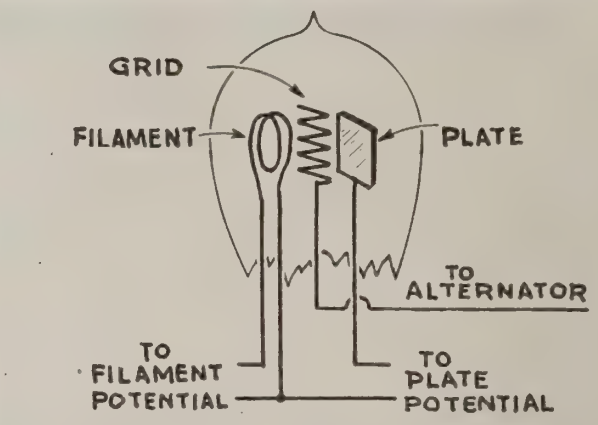


Fig. 5—The grid serves to dissipate the space charge and its potential determines the current flow in the plate circuit

amplification of incoming signals can thus be obtained. Frequently three vacuum tubes are connected in cascade, each amplifying the signals of the preceding one, and amplifications in the order of 1,000 times the original strength of signal are obtained. This makes possible the design of loud speakers, which will take a weak signal and so augment it that it will be audible two hundred feet from phones. In transcontinental telephony weak voice current are magnified by this means so that clear and strong signals come in over a line three thousand miles long.

In the consideration of the amplifying action of the vacuum tube, I have assumed that an alternator was placed in the grid circuit. The fact has been established that any change in grid potential causes an exactly similar but considerable augmented current to flow in the plate circuit. The use of the vacuum tube as a generator of high frequency currents is merely an application of this amplifying action. Instead of an alternator (see Fig. 8), a coil having from twenty to a hundreds turns of wire is placed between the grid and filament. Inside of this coil, inductively coupled to the grid coil, another coil of similar size is placed, which is connected between the plate and the filament.

Let us see what happens when the current is turned on and the filament lit. At first there is an instantaneous rush of current to the plate, through the coil of wire back to the filament. This rush of current is checked when the space charge begins to accumulate. As the current flows through the plate circuit, it passes through the coil of wire, causing a magnetic field to



Fig. 6—The source of power for the radio telephone is a small wind-driven generator, mounted on the landing gear

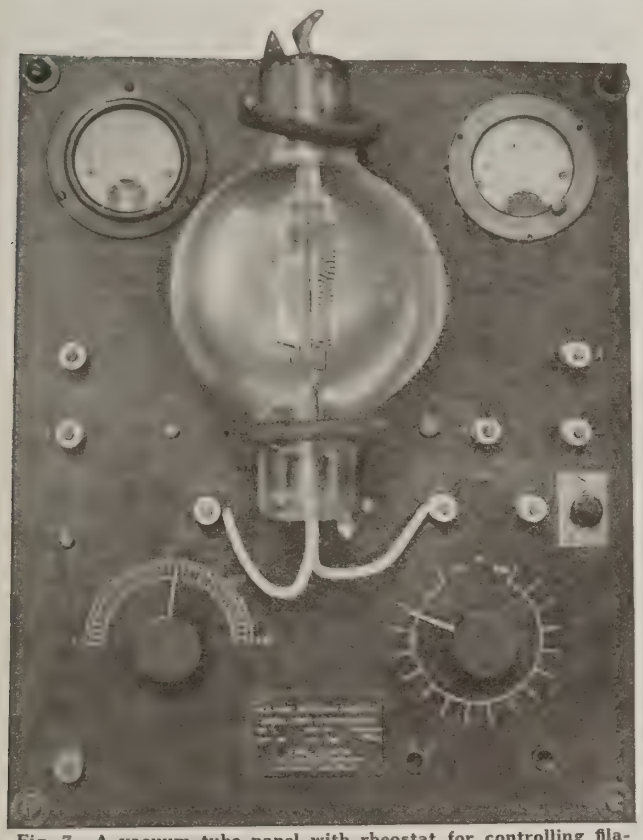


Fig. 7—A vacuum tube panel with rheostat for controlling filament brilliancy, filament ammeter and plate circuit ammeter

surround it. This field interlinks with the coil in the grid circuit, causing a change of potential on the grid. This in turn causes a change of plate current, which again has its effect on the grid, through the intermediary of the coils. And so on. The frequency of these oscillations, which continue in perfect sine wave form, is determined by the size of the coils used. On aeroplane transmitters this frequency frequently reaches the figure of two million alternations per second.

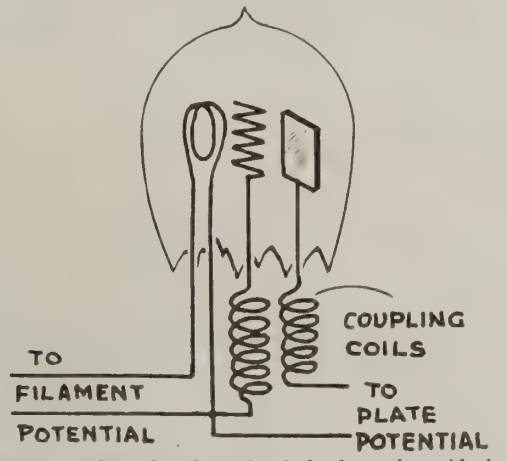


Fig. 8—By coupling the plate circuit back to the grid circuit a "repeater" effect is obtained, the grid serving as a trigger

To radiate these waves into the ether, it is merely necessary to couple the plate coil to the trailing antenna on one side and the "ground," which on board a plane in flight is the motor and bonding wires, as shown in Fig. 9. A microphone is added in the grid circuit, which modulates the emitted currents to the vibrations of the voice. These are picked up by the receiving antenna, rectified and amplified as already described.

We have successively described the functioning of the vacuum tube as a rectifier, amplifier and oscillator. All three of these functions can be performed at the same time by the same tube. On most Signal Corps apparatus, however, several tubes are used, each adapted to its particular function. Considerations of detail, however, are not within the scope of this article.

As an illustration of how freely even the earlier types of bulbs could be manipulated, the reader will recall the conversations by radio telephone between Arlington and Honolulu, a distance of 5,100 miles. For this purpose, at least 300 tubes were used in the course of the experiments, and on several occasions as high as 500 tubes were generating currents at the same time.

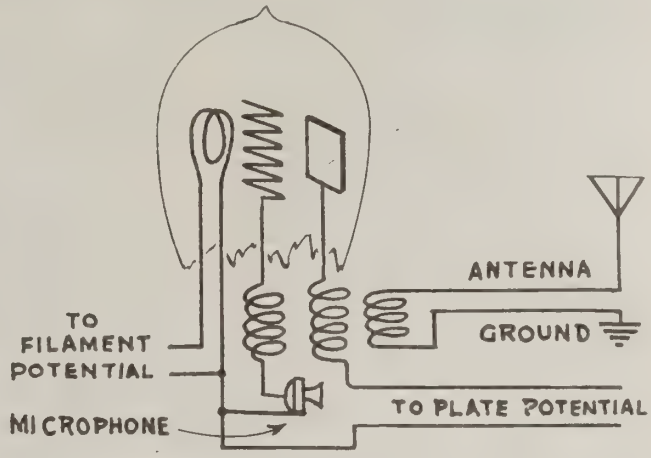


Fig. 9—The plate circuit currents, regulated by the voice, are passed off into the ether through coupling coils

Aside from military use, the aeroplane radio telephone has been already used on passenger carrying planes. The aeroplanes which are used to ferry members of the Peace Conference between London and Paris are equipped with radio telephones, so that Lloyd George and Bonar Law can get in touch with officials during flight as efficiently as in their offices.

It has been demonstrated by General Kenly and Secretary Daniels that it is quite practical to use the commercial wire telephone as far as a convenient radio telephone transmitter which is in range of a plane in flight, and transform the voice currents into radio waves, and converse over the circuit, partly wire, partly radio, without difficulty. By this means an aviator flying over the Alps can telephone by radio to a ground station below, his voice carried by wire to a high power trans-Atlantic radio telephone transmitting station, transmitted to a radio receiving station in the United States, carried over the continent by the wire telephone lines, and re-radiated into the ether to a plane flying over the harbor of San Francisco.

The British Marconi Company is already prepared to give radio service aboard aircraft on terms similar to those applying to shipboard installations. We can, therefore, look forward to the time when radio communication will form an even more vital and important function in aerial commerce than in marine commerce.

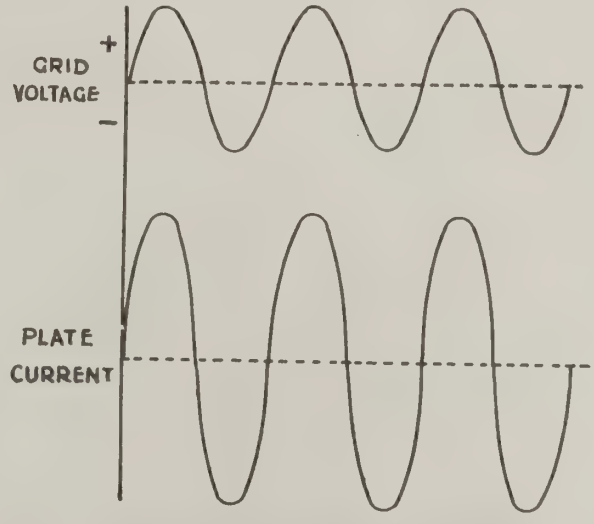


Fig. 10—The plate current is dependent on and faithfully reproduces all variations of grid potential, when adjustments are correctly made

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N, Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Olcott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in the order named.

Note 2—Report to Director of Air Service, Washington, D. C.

Note 3—Report to Camp Lee, Va.

Note 4—Report to Camp Travis, Texas.

Note 5—Report to Aberdeen Proving Grounds, Aberdeen, Md.

Note 6—Report to Camp Jesup, Atlanta, Georgia.

Note 7—Report to 461 Eighth Avenue, New York City.

Note 8—Report to Camp Kearny, Linda Vista, California.

Note 9—Report to Military Attaches, Belgium, to assist in passport control work in Antwerp, Belgium, and will proceed to Brussels, Belgium, and report first of all to Military Attache, American Legation.

Note 10—Report to Camp Pike, Ark.

Note 11—Report to Bureau of Aircraft Production, Pittsburgh, Pa.

Note 12—Report to Fox Hills, Staten Island, N. Y., to General Hospital No. 41.

Note 13—Report by letter of Chief of Construction Division, Washington, D. C.

Note 14—Report to Letterman Hospital, San Francisco, Calif.

Special Orders Nos. 89 to 95, Inclusive

A

Allis, Frank H.....FLA
Armsby, Gordon Seaverno.....CAP
Ashley, Harold H.....JMA

B

Birdsall, Carl A.....CAP
Bird, Stewart.....CAP
Bongiorno, Philip.....CAP
Babcock, Harold P.....CAP
Bardwell, Harold E.....CAP
Burdick, Howard.....FLA
Babcock, Philip H.....JMA
Brett, George M.....MAJ
Benner, Harry M.....LDT; WFO; Note 1
Barrall, Arthur Decator.....FLA
Boulware, Barrett W.....WFO
Brereton, Lewis H.....JMA

C

Campbell, Jesse Frank.....CAP
Colbert, Lewis F.....CAP
Costello, James Francis.....CAP
Curtis, Edward P.....CAP; JMA
Conant, William M., Jr.....MAJ
Chambers, Reed M.....JMA
Coleman, Loring Wilkins.....FLA
Craig, Iltred W.....Note 10

D

Davis, Theodore P.....CAP
Davis, Walter C.....CAP
Doty, Frank Langdon.....CAP
Downing, Blatchford.....CAP
Drayton, Harry C.....CAP
Diekema, Willis A.....JMA
Delk, Edwin Buehler.....FLA
Dickinson, William Earle.....FLA
Davis, Richard S.....MAJ
Dorsey, Floyd Leslie.....RSD
deObarrio, Peter.....MAT

E

Eypper, George W.....CAP

F

Fawcett, Roscoe.....CAP
Fritz, Emanuel.....CAP
Fagan, Lambert Anicetus.....FLA
Felts, Jess Alonzo.....FLA

G

Getty, Lorenzo T.....MAJ
Gallagher, John F.....MAJ
Greene, Carl F.....Note 2
Gannon, Thomas G.....FLA
Goodloe, Alfred M.....FLA
Gros, Edmund L.....LTC

H

Hogan, Harry C.....FRF
Hall, Thayer D.....Note 14
Hickey, Daniel F. B.....CAP
Hoeppel, John H.....FLA
Hogg, Robert L.....FLA
Hopkins, Albert Lynn.....FLA
Haslett, Elmer R.....JMA
Hale, Fraser.....Note 2
Howard, Clinton W.....Note 2
Hume, Alan P.....CAP
Hall, Melvin A.....JMA
Harwood, Benjamin P.....JMA

J

Jewell, John B.....FLA
Johnson, Andrew B.....CAP
Joyce, Temple N.....CAP

K

Kelly, John M.....CAP
Kronig, Louis H., Jr.....CAP

L

Lewis, Harry T.....FOB
Lawton, Mortimer Powell.....FLA
L'Ehmann, Chester L.....Note 8

M

Mabry, Dale.....CAP
Malone, Paul.....CAP
Martin, Frank E.....CAP
McLaughlin, James Francis.....CAP
Mehorney, Robert Lee.....CAP
Merkel, Richard Hans.....CAP
Molthan, Emil H.....CAP
Morton, Charles I.....CAP
Maguire, Frank Haim.....MAJ
Mackie, Norman S.....FLA
McKee, Frank M.....FLA
MacElroy, Andrew Jackson.....MAJ
Morris, Edward M.....FLA
Mitchell, William.....JMA
Meert, Frederick W.....Note 9
McCullough, Maxwell L.....Note 2
Merrill, Leland H.....Note 10
MacLachlan, Lynn R.....CAP
Mulligan, W. J.....Note 11

N

Newhall, Norton L.....MAJ
Noel, Olen W.....Note 6
Niemann, William E.....CAP
Norton, Oliver G.....CAP
Noyes, Stephen H.....JMA
Nordhoff, Charles B.....FLA

O

O'Brien, William Joseph.....FLA
Odale, Walter B.....Note 2
O'Rourke, Lawrence James.....KST

P

Peters, Heber Wallace.....FLA
Pouchee, Wayne C.....Note 10
Porter, Kenneth L.....JMA
Paulding, Charles G.....CAP
Pierson, Norris E.....CAP

R

Richardson, John S., Jr.....CAP
Roberts, Charles S.....CAP
Roosevelt, Philip J.....MAJ
Roman, Oscar.....CAP
Reynolds, John N.....Note 2
Rogers, John H.....Note 3; Note 13
Reitz, Clayton E.....FLA
Roper, George M.....Note 10

S

Sewall, Sumner.....CAP
Schroedl, Othello H.....CAP
Stafford, Charles Emile.....CAP
Stevens, Albert William.....CAP
Sturgis, Henry S.....CAP
Sturrock, Walter.....FLA
Steckle, John M.....FLA
Smith, Frank V.....FLA
Spatz, Carl.....JMA
Schiff, Loren D.....Note 5
Saltan, David L.....Note 3
Soubiran, Robert.....MAJ
Sanford, Harold M.....EOT
Saunders, William H.....JMA
Stookey, George Chapman.....Note 12

T

Thayer, Lucien Hamilton.....FLA

U

Upington, Claude D.....MAJ
Usher, George L.....Note 7

W

Weller, Karl F.....FLA
Wickizer, Claude Ernest.....FLA
Wingate, Harry L.....MAJ
Watt, David.....Note 2
Wheat, Carl I.....FLA
Waterman, Cameron Beach.....MAJ
Washburn, William Day.....Note 4

Recent Naval Orders

Commander John H. Towers, to command of N. C. seaplane division No. 1.

Lieutenant Commander Marc A. Mitscher, to connection transatlantic flight.

Lieutenant Commander Patrick N. L. Bellinger, Lieutenant Commander Albert C. Reed and Lieutenant Commander Robert L. Lavender, to connection transatlantic flight.

Lieutenant David H. M. Culloch and Lieutenant Louis T. Barin, to duty in connection with N. C. seaplane division No. 1.

Lieutenant Henry W. Hoyt, to assume command U. S. Naval Air Station, Akron, Ohio.

Lieutenant Robert D. Kirkpatrick, to naval air station San Diego, as executive officer.

Lieutenant (junior grade) Ralph H. Norris, to duty naval air station, Montauk, L. I., N. Y.

Lieutenant John F. Meloney, to naval air station, Cape May, N. J., for dirigible balloon training.

Lieutenant (junior grade) A. H. Beggs, to duty naval air station, Anacostia, D. C.

Army Aero Field to be Established at Camp Bragg

A flying field is to be established at Camp Bragg, North Carolina. It will be known as Pope Field, in honor of Lieut. Harley H. Pope, who lost his life in an aeroplane accident.

Reserve Naval Aviators Invited to Take Examination for Regular Service

Washington, D. C.—The Navy Department is preparing to invite requests from Reserve aviators who desire to take examinations for the regular service, providing Congressional authorization is granted permitting a limited number to enter the regular navy. Only such reservists who pass special examinations will be permitted to enter the regular service.

Official Films of War in the Air to be Released by Signal Corps

Washington, D. C.—The War Department has officially announced that it will arrange for the release of thousands of feet of film, taken by the Signal Corps, of all phases of military activity, including training and combat work of aviators. These films will be released to form part of the film "news weeklies."

Kelly Field's Altitude Record Broken

San Antonio, Tex., April 17.—Lieut. W. R. Sweeley broke the Kelly Field altitude record in a Curtiss JN-4H aeroplane, by reaching an altitude of 19,600 feet.

Demobilization of the Air Service

Progress in Demobilization

According to reports received from the Air Service the net decrease in the total commissioned and enlisted strength from the date of the armistice to April 10 was 68 per cent.

The following table shows the distribution and per cent. of net decrease to April 10. The strength April 10 includes only officers and men not yet ordered discharged; it does not include 2,088 men at demobilization camps awaiting discharge.

	Nov. 11	Apr. 10	Per cent net dec.
Cadets	5,775	879	85
Officers	20,586	6,609	68
Enlisted men	164,266	54,003	67
Total	190,627	61,491	68

Demobilization of Air Service Personnel Overseas

During the week ended April 19, 1919, the Air Service personnel overseas decreased 752 men, as against a weekly average of 2,457 during the eight preceding weeks. The strength of the Air Service in the United States and overseas is shown for various dates in the followign diagram:

	U. S.	Overseas
November 11	111,846	78,786
December 2	115,216	78,061
December 26	99.010	59.917
January 30	46,919	57,527
February 27	33,649	53,087
March 28	25,347	41,800
April 10	20,636	40,855

Sixty-seven per cent. of the officers of the Department fo Military Aeronautics and 63 per cent. of the Bureau of Aircraft Production have been discharged.

Victory Button for All Who Served in War Being Issued

Washington, D. C.—A lapel button will be issued to all officers and enlisted men (excepting members of the S. A. T. C.) upon forwarding discharge papers or duly certified copies to supply officer of the nearest military post, camp or station, including recruiting stations.

The button for those wounded in service is of silver; all others receive a bronze button.

Signal Corps Issues Radio Instruction Book

The Signal Corps has issued its comprehensive radio instruction book, known as "Radio Pamphlet No. 40." This book was prepared for the rapid training of radio electricians at the Bureau of Standards under the direction of the Training Section of the Signal Corps by Dr. J. H. Dellinger, in collaboration with a group of radio authorities.

This book is an excellent instruction treatise for practical radio men, as it deals not only with radio theory and radio instruments, but covers thoroughly those phases of electrical engineering that apply to the radio art. In fact, 170 pages are devoted to A. C. and D. C. theory, motors, dynamos and storage batteries, and 180 cover thoroughly radio theory and practice.

The chapter dealing with vacuum tubes, their theory and use, is particularly clear and comprehensive.

Honorable Discharges

The following officers are honorably discharged from the Service of the United States: First Lieutenants Clarence N. Walker, Edward J. Nolan, John H. Snyder, George E. Ramey. Second Lieutenants: Roger D. Acker, Carl H. Butman, William P. Boyd, Warren P. Gillelen, Jr., Charles J. Henderson, Frank S. Welsh.

New Commanding Officers for Love, Payne, Selfridge and Ellington Fields

Washington, D. C.—The following Special Orders, recently made public, announce new commanding officers for several important field:

Lieutenant-Colonel Harvey B. S. Burwell, J.M.A., A.S.A., ordered from Rockwell Field, San Diego, California, to Love Field, Dallas, Texas, to assume command.

Major Clinton W. Howard, J.M.A., A.S.A., ordered from Rockwell Field, San Diego, California, to Payne Field, West Point, Mississippi, to assume command.

Major Albert L. Sneed, J.M.A., A.S.A., ordered from Love Field, Dallas, Texas, to Washington, D. C.

Major Jacob H. Rudolph, A.S.A., ordered from Chapman Field, Miami, Florida, to Selfridge Field, Mount Clemens, Michigan, to assume command.

Lieutenant-Colonel Lawrence W. McIntosh, J.M.A., A.S.A., ordered from Selfridge Field, Mount Clemens, Michigan, to Ellington Field, Houston, Texas, to assume command.

Major John E. Russell, J.M.A., A.S.A., ordered from March Field, Riverside, California, to Hazelhurst Field, Mineola, Long Island, New York.

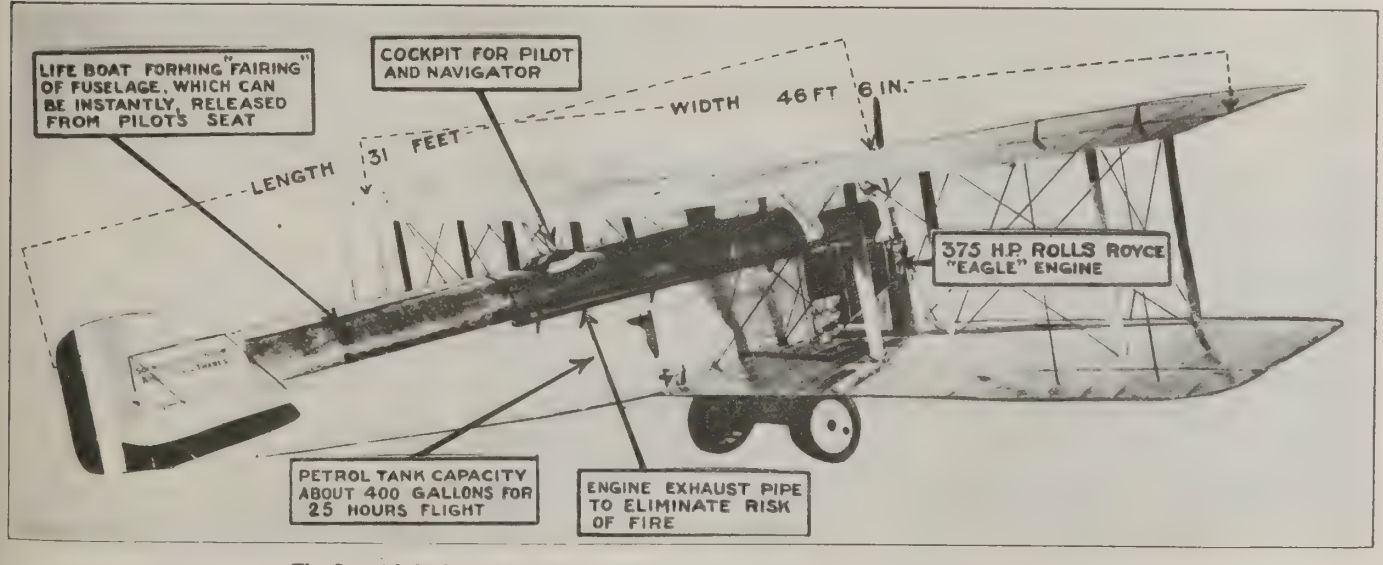
Officers Designated Reserve Military Aviators

The following-named officers, having completed the required tests, are rated as Reserve Military Aviators: Captain Lloyd T. Jones, Captain James A. Langston, First Lieutenant Hiram E. Wilson.

Navy Aviators to Attempt Speed Tests

Hampton Roads, Va., April 26.—Following the announcement of the establishment of the 20-hour 1,250-mile naval endurance record, officers at the Naval Station at Hampton Roads declared that a seven-hour speed test would be attempted in the near future.

It is proposed to use a faster fachine than the F-5 that made the endurance record and the route will be between New York and Norfolk. Naval aviators believe they can make two round trips from Norfolk to New York within seven hours, if weather conditions are favorable.



The Sopwith biplane, in which Harry Hawker will attempt to fly across the Atlantic

FOREIGN NEWS

Chile Planning Insurance for Aviators

A bill for the establishment of insurance for flying officers who have not come under the regulations for flying pay is under consideration of the Congress now in session.

Aerial Transport Route in Spain

Several French airmen are studying the problem of an aerial transport line between Toulouse, France, and Rabat, in Morocco. The route will follow the Spanish coast of the Meditteranean and Barcelona is to be the first landing place. Lieutenant Lemaitre will be directing pilot of the line. Two-seater biplanes, powered by Salmson engines, built by the firm Latacoere will be used on the route.

Royal Aero Club of Cataluna Establishing Landing Field

The Royal Aero Club of Cataluna is establishing a landing field not far from the center of the city, in order to foster aviation in Spain. This will provide two landing fields in Cataluna, for the Catalan Aviation School has its grounds on the outskirts of the city.

Vedrines, Pioneer Aviator and Record Holder, is Accident Victim

Paris.—Jules Vedrines, a noted French aviator, was killed on April 21 when his machine fell in the Department of Drome while attempting to make a non-stop flight from Villacoublay to Rome, over a route of 700 miles.

Jules Vedrines was one of the leading French airmen. One of the first Frenchmen to take up aviation, he was very active in 1911 and 1912 in aerial races in Europe, winning the Paris-Madrid race, finishing fourth in the European circuit race, and making various records for height, distance and speed, and finishing second in the British circuit race.

He was one of the first aviators to fly from London to Paris, doing this on August 4, 1911.

In August, 1912, he came to America and won the international aviation race at Chicago on September 9. In 1913 he flew from Paris to Cairo.

Vedines served in the French aerial service early in the war and was later made an instructor. On January 19, this year, he accomplished the feat of landing on a roof of a building with an aeroplane.

Canadian Government Will Subsidize St. Maurice Forest Protective Association to Aid in Purchase of Aeroplanes

The Province of Quebec does not intend to have aeroplanes of their own to patrol its vast forest area, but this session the St. Maurice Forest Protective Association will be given a subsidy to aid in its task of guarding the forests on the St. Maurice with aeroplanes. The association which comprises big companies with timber concessions is now in communication with the Hon. C. C. Ballantyne, Minister of Marine and Fisheries, with a view to securing some aeroplanes, and the work of patrolling by this method will commence next summer, according to reports to Hon. Jules Allard, Minister of Lands and Forests. Hon. Mr. Allard's bill respecting the protection of forests against fire was introduced in the Legislative Assembly by Hon. L. A. Taschereau.

Prague Becoming Aviation Center

Prague, April 7.—Prague is to become the great junction of air routes of Central Europe. From the flying grounds of Prosek, near here a regular service of "air buses" will be started soon to Padua, Italy, via Vienna, a distance of 225 miles.

Trial flights already have taken place, the duration of the trip being four hours and fifteen minutes. The machines used will be Italian triplanes with motors developing 2,000 horsepower, and carrying forty-seven passengers.

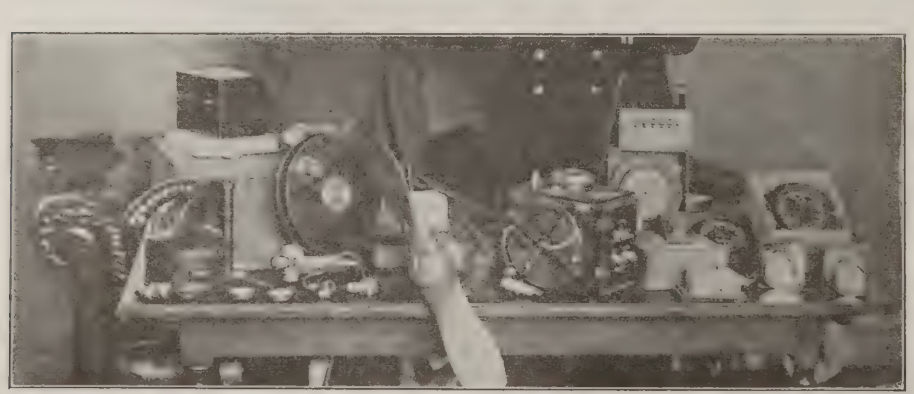
Canadian Pacific Railway Asks Official Permit for Air Transport

Ottawa.—The Canadian Pacific Railway Company will ask Parliament for authorization to operate an aircraft service between such points within or without the Dominion as it may find desirable, it was announced officially recently.

Echo de Paris Offers $60,000 Prizes for Touring Flights

The *Echo de Paris* is offering $60,000 in prizes for a competition in which safety and comfort will be the chief consideration before the judges in making their awards.

The course will consist of some 20 stages totalling 2,500 miles. It will cover the principal towns in France and stretch into all neighboring countries except Germany.



The radio and instrument equipment for the Short Trans-Atlantic plane which Major Wood will attempt to fly from Ireland to Canada

Air Ministry to Dispose of 30,000,000 Yards of Linen

In answer to a question raised in Parliament, an official of the Ministry of Munitions stated that the total stocks of linen on hand and available for disposal is 31,970,725 yards.

Seaplane Bomber Converted Into Thirty Passenger Carrier By Air Ministry

London—In the Navy Dockyard at Lorient the trials have been taking place of a giant seaplane which was originally intended for war purposes, and which has now been converted for commercial use. The first trials have given excellent results. The seaplane is driven by three 12-cylinder motors of 400 h.p. each, which drive three propellers, two at the rear and one in front. The body of the machine will accommodate thirty passengers. The three motors require 235 litres of petrol an hour. The speed is from 78 to 93 miles an hour, and an uninterrupted flight of ten hours can be made, as two petrol tanks holding 1,110 litres of petrol each are carried.

Four Rival Companies to Operate London-Amsterdam Service

It is stated from Amsterdam that no fewer than four syndicates are preparing to start companies for establishing aerial services between London and Amsterdam. According to the *Telegraaf* the British authorities have suggested to these syndicates that they should come to an agreement and form one joint company. Steps in this direction are accordingly being taken.

Federation Aéronautique Internationale to Meet in Neutral Country

At an early date, the first meeting of the Fédération Aéronautique Internationale is to be held, probably, according to *The Aeroplane*, in a country that was neutral in the great war. Amsterdam, it is stated, is almost certain to be chosen. Madrid was mentioned in this connection, but unsettled political conditions in Spain and the greater distances for most of the delegates to travel there have led to the choice of Amsterdam. Germany—and probably Austria also—will be represented at this important meeting of the F. A. I.

New Title for British Cabinet Minister Representing Air Force

The King has approved the substitution of the title "Secretary of State for the Royal Air Force" to that of "Secretary of State for Air."

Prince of Wales's Flight Over London

The Prince of Wales paid a visit to the Handley Page factory and aerodrome at Cricklewood recently, and went for a flight in a Handley Page machine, type 0.400, with two Rolls-Royce engines. The pilot was Lieutenant Carruthers, R.A.F., and the other passengers were Lady Joan Mulholland, Lord Claud Hamilton, and Admiral Mark Kerr.

The flight lasted about one hour, and the machine passed over Buckingham Palace, the Houses of Parliament, Fleet Street, and St. Paul's Cathedral.

The Prince spent some time with Lieutenant Carruthers, having the whole mechanism explained to him. While the wings were being folded back preparatory to housing the machine, another Handley Page aeroplane of the same type (0.400) passed over the Cricklewood aerodrome with Mr. Bonar Law on his way to Paris.

British Engineering Standards Association Prepared 130 Aircraft Standards

During the past year and a half the British Engineering Standards Association, 28 Victoria Street, S.W.1, has been responsible for the preparation of all specifications for aircraft materials on behalf of the Department of Aircraft Production. During this period some 70 British standard specifications for aircraft materials were issued, and 60 more were practically complete when hostilities ceased. These specifications were distributed to the makers by the department, as the whole of the aircraft production of this country was under its control.

Farman's Goliath Makes First Regular Paris-Brussels Flight With Distinguished Passengers

On Saturday, March 22nd, M. Farman's "Goliath" left Toussus-le-Noble, near Paris, on its first civilian passenger service flight between the French and Belgian capitals, according to *The Aeroplane*. The start was to have been at 9 a. m., but was delayed owing to the snow. The machine eventually left the aerodrome at 1.25 o'clock, piloted by Lt. Bossoutrot.

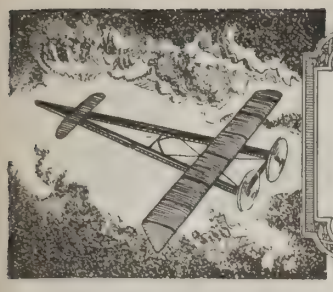
The burgomaster of Enghien (Belgium) was among the passengers, and on the return journey M. Rafaël Guariglia, Italian Charge d'Affaires at Brussels, was carried. The return journey was made on Sunday, the 23rd. The respective times were: Outward, 2 hrs. 50 min.; return, 2 hrs. 57 min., the machine landing at Toussus at 5:45 p. m.. The service will be weekly until further notice.

Lieut. Roget Flies from Marseilles to Paris in 3¾ Hours

Lieut. Roget, who on January 26 made the double flight across the Mediterranean, flew from Marseilles to Paris in a Renault-motored Breguet biplane in the remarkable time of 3¾ hours. The distance from Marseilles to Lyons was covered in 1 hour and 45 minutes. The average time for the entire flight was 143 miles an hour. By rail the journey requires 14 hours.

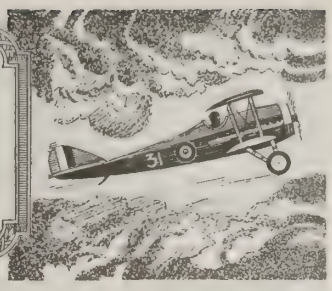
French Aviator Flies 560 Miles in 5 Hours

Lieut. Janquet and two passengers flying from Alicante via Barcelona to Toulouse accomplished the 560 miles in five hours.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



A Speed Model Aeroplane

THE model shown in the accompanying drawing in this issue is what is known as a SPEED model, and some have been known to travel at speeds greater than 50 miles per hour. In fact, one designed by the writer, which was exactly like the drawing, and used in a speed contest held at Van Cortlandt Park about four years ago, travelled at the rate of 55 miles per hour.

These speed contests are held over a measured piece of ground one-tenth of a mile long, and the model must pass each point—that is, the starting and finishing lines—in order to be officially timed.

It is a very hard thing to control these models, as the least little change in the wing surface or even a slight resistance on one side will make the model turn in a circle. I have seen model after model started in these speed contests and never reach the finish line, although they would cover much more ground travelling in circles than would be necessary in the straightaway distance.

Although the model in the drawing looks out of proportion and awkward, it is a very fine looking machine in the air, and the model builder is well paid for his work by the flights and the enjoyment he gets out of it.

These differ to the long distance models inasmuch as one need not travel as far to bring the model back after each flight, and, again, four sets of rubber are needed to complete the model.

While a speed contest will not be included in the coming contests, it would be well for models clubs who intend conducting a set of flights for prizes to include a speed contest on the program, and I am sure that it will be the closest contested and most enjoyed of the program.

The expense of building a model of this kind is very low and one can be constructed from parts saved from wrecked long distance models.

To construct the model proceed as follows:

Make the frame first of ¼ x 3/16″ spruce 30½″ long. The ends of each longeron is tapered slightly and fastened together with thread and glue forming the apex of a "V." This frame is known as an "A" frame and is the strongest known for model construction. A piece of spruce ¼ x ⅛″ and about 17″ long is given a stream-line shape and fastened across the main longerons at a point a few inches from the rear, as shown. This becomes the hanger for the outside propellers. This spar must be braced at the ends with a piece of bamboo running from the ends of the spar to the longers. This takes up the pull of the rubber motors. Bearings made of 1-32″ I.D. brass tubing about ⅜″ are soldered to strips of brass and fastened to the ends of this spar. Two more bearings made of a piece of tubing with a copper washer soldered to each and fastened by inserting into a block of wood are fastened to the ends of the longerons, on the top side. These bearings are for the inside propellers.

The propellers are of the low pitch type and are 8″ in diameter. There are four in number and all are pushers.

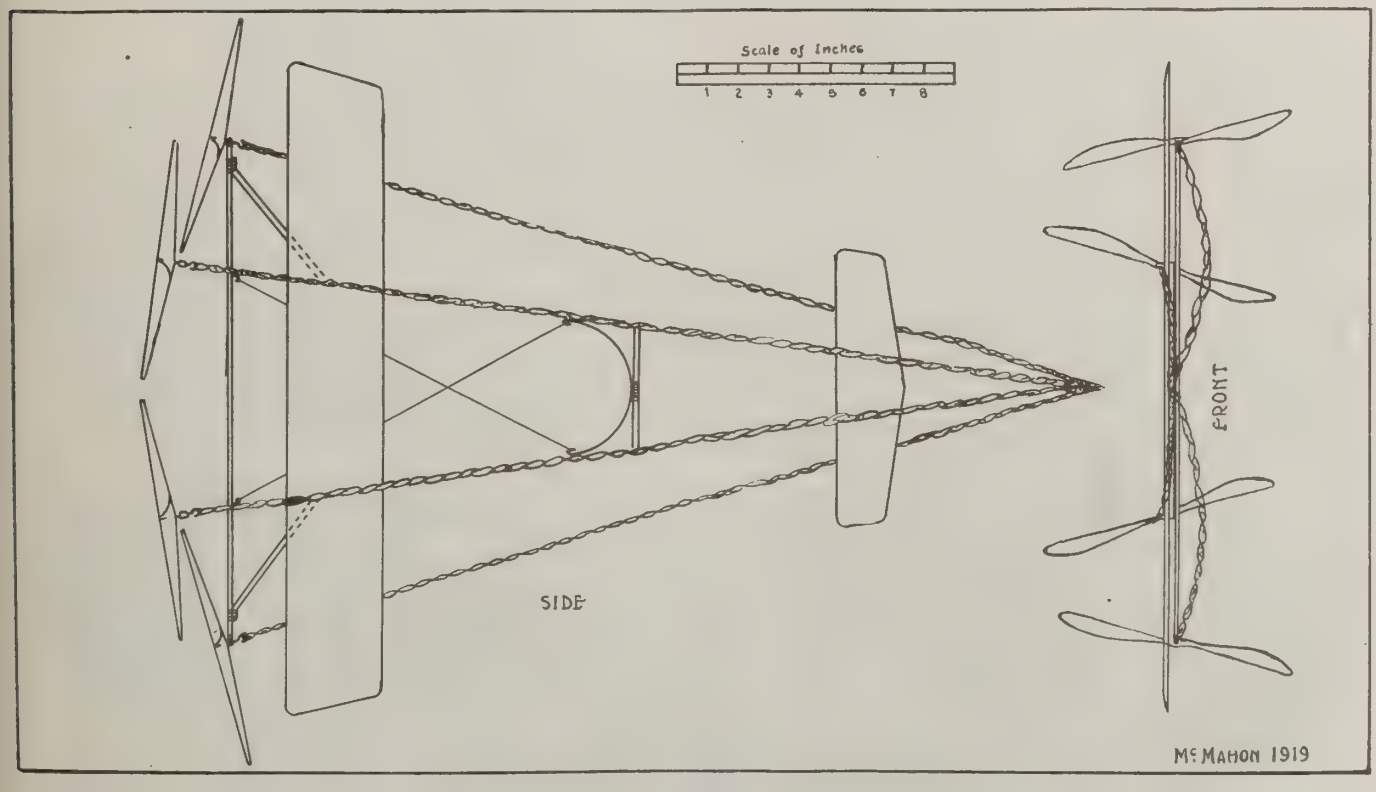
The best way to make the wings is to procure a piece of white pine or clear spruce 3/16″ thick, 3 x 22″, and sandpaper one side to a smooth finish. This side is the under side of the wing. The top should then be shaped to a true wing shape and sandpapered to a smooth finish, as before. Then two coats of shellac should be applied. In order to keep the wings from splitting many model builders glue silk to the under side of the wings and after drying press it with a hot iron. Then shellac or a varnish made of *Ambroid* glue diluted with acetone or banana oil is applied to give it strength.

The wings should be fastened on to the model with rubber bands to allow free movement forward if the model should strike the ground forcefully.

The balancing of a model of this kind is very difficult, and it requires patience and many tryouts before the correct balance is found.

The proper way is to wind the rubbers up to their full capacity, and have the main wing about away from the first or outside set of propellers. The elevator should be up to about 4 inches from the apex of the "V" and should have the front edge elevated about ¼″ higher than the trailing edge.

When the model is released it will be easily seen whether the model is correctly balanced or not, and it will be protected from pitching nose first to the ground.



High speed rubber powered motor described above



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

The Man Who Stayed at Home

(With apologies)

I have a "gold" lieutenancy,
A "shave-tail" in the A. S. C.,
I'd like to fight for Liberty,
But I must STAY at home.

I've not a worry or a care,
The greatest danger that I dare,
Is slipping from my swivel chair;
I have to STAY at home.

I've got about as much a chance
Of getting over there to France
As dead canaries have to dance,
And so I STAY at home.

Each day I ask the Colonel please
With tear-stained cheek and bended knees,
To only send me overseas,
But still I STAY at home.

He puts my name upon the shelf,
And wishes me the best of health
And says he can't get there himself—
And so I STAY at home.

I see myself in future life,
With carcass free from wound or strife,
Explaining to my loving wife,
Why I had STAYED at home.

—*S. B. S.*

In Air Service Parlance

Private "C.C.Pill" inserted the following brief notation in his diary of his pal's most exciting experience in France:

"A.B.P. in the S.O.S. at A.S.P.C. No. 2 went A.W.O.L. on the Q.T. He was nabbed by the M.P. at A.P.O. 702 at 8.05 P.M. His C.O. was O.D. at the time, so he got a C.M.P.D.Q. Charge 94th A. of W., Par. 41144, G.O. 1313. Findings G. as C. Sentence, 2/3 of 2 and 30 at K.P. The O.I.C. forbade him to go to the A.R.C. or Y.M.C.A. In short, he was S.O.L."—*E. and V., 466th A. S., in "Yank Talk."*

How Do They Do It?

(Lieutenant Thompson is an Air Service cadet, watching the mechanics tune up his plane for his first solo flight.)

Lt. Thompson to Mechanic: "What's the trouble with this ship?"

Mechanic to Lt. Thompson: "Sir, the bearings are burned out." (Lt. Thompson looks at mechanic in astonishment.)

Lt. Thompson to Mechanic: "I thought these ships were equipped with fire extinguishers?"

Mechanic to Lt. Thompson: "Yes, sir; they are."

Lt. Thompson to Mechanic: "Well, why didn't you use it?"

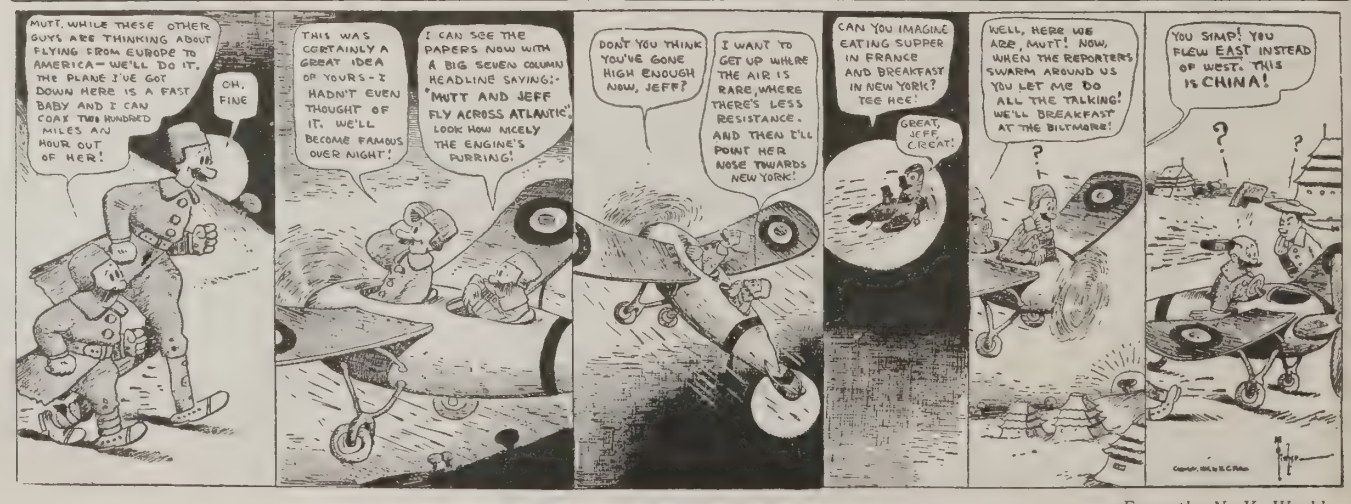
The Transatlantic Flight

Unto the 'wakened Element, its lover;
The Aeroplane, flying over!
Midocean hears those wings—
The high adventurings
Of man's soul, so desiring
The upper skies—so long aspiring!
Always there have been ready
Heroes whose wills were steady—
Who were in love with the Unknown.
How soon to come into their own!
Even now, they robe for flying—
They, the Undying!
Yes, though they were to fall,
'Twere to Valhalla's hall!
Shine, sun and moon of Ajalon,
Such deathlessness upon!
Wane, tempest, and be gentle, storm,
When wings the Chosen's form!
O sunlight, flash on
This new, immortal passion,
This heaven-intoxicated science.
Irreverent, but absolved defiance,
Man's powers gloriously taxing
Earth at your waxing,
And answering aether tidal,
This is your ever-destined moment bridal.

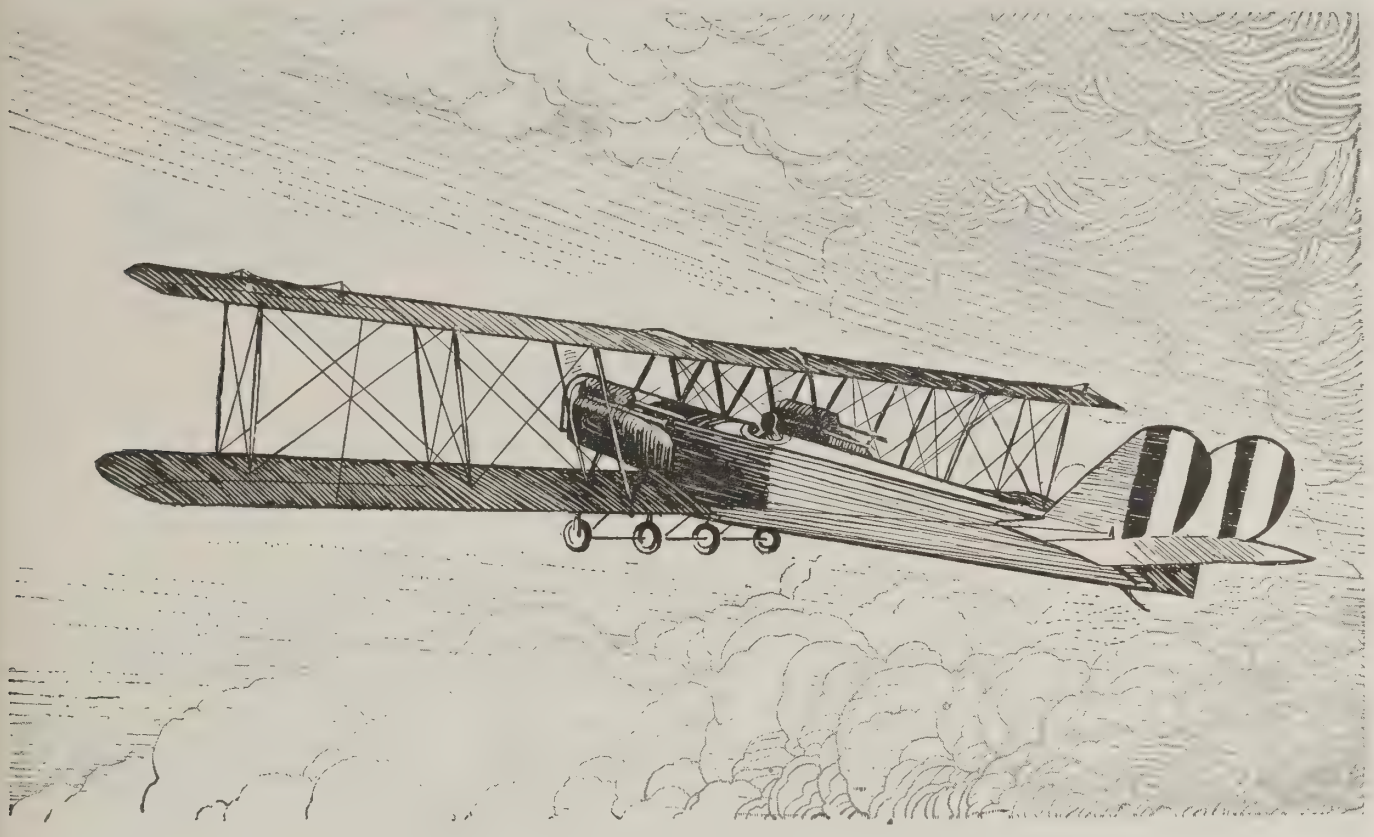
—*Isabel Fiske Conant,* in the *New York Times.*

MUTT AND JEFF—They Attempt a Transatlantic Flight . . . . . By BUD FISHER

(Copyright, 1919, by H. C. Fisher. Trade Mark Reg. U. S. Pat. Off.)



—*From the N. Y. World.*



Valsparred in war and peace—

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And it's still Valsparred, of course.

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Valspar Khaki Enamel
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Valspar Primer (Metal)
Valspar Primer (Wood)
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Quick-Drying Insignia Colors
Valenite
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A Three Months Record

From the First of January to the end of March—three months—AERIAL AGE readers had a greater volume of authoritative material presented to them than the readers of any other aeronautical publication in America. The following is the remarkable record:

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17 Illustrated Aeroplane Descriptions
20 Illustrated Motor Descriptions
610 General News Paragraphs
491 Illustrations
371 Advertising Pages

Since the Signing of the Armistice

Much engineering data of great value could not be published on account of censorship regulations prior to November, but when the censorship was lifted AERIAL AGE was

The First to Describe

(1) The Liberty Motor, devoting fourteen pages to a complete description, including fifty illustrations.
(2) The Hispano-Suiza Aviation Motor, telling the complete story with twenty-six illustrations.
(3) Description of Naval Aircraft Factory with many photographs.
(4) Duesenberg 850 H.P. Motor, with complete illustrations and diagrams.
(5) King-Bugatti Motor, sixteen pages and forty illustrations.
(6) The N.C-1 Flying Boat, Caproni Triplane, Standard Handley-Page, Standard El Defense Scout, Standard Postplane, Christmas Bullet, Bellanca Biplane, Gallaudet Seaplane, Le Pere Fighter, Ordnance Scout, De Haviland 4, Breguet-Biplane, Sunstedt Seaplane, etc.
(7) Complete report of Hughes Aircraft Investigation.
(8) Complete aircraft reports by Secretary Baker, General Kenly, Secretary Daniels, J. D. Ryan, and Postmaster General Burleson.
(9) Aero Club of America plans for Captain Bartlett's flight to the North Pole to explore 1,000,000 miles of unexplored territory, to collect data on air currents as well as to make soundings in the Polar Basin.
(10) The extensive plans of the Aero Club to foster aerial transportation, sport, etc., with list of seventeen trophies and prizes to be competed for during the coming year at Atlantic City.

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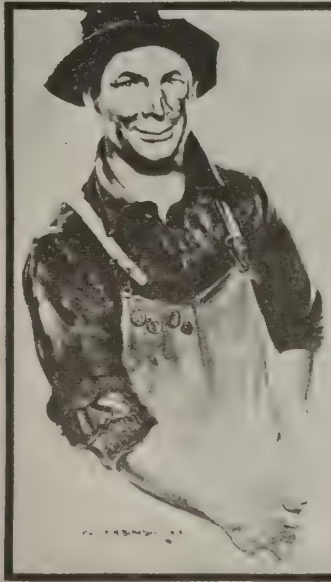
FIRE—AUTOMOBILE—TORNADO—EXPLOSION—RIOT AND CIVIL COMMOTION

(*Continued from page* 386)

brush, quality and nature of soil, geological features and other facts of interest to the lumberman. If photographs were taken with a stereoscopic camera, they could be viewed through a stereoscope and undulations of the ground which would tell the direction of the flow of streams could be observed.

The great saving of time, the increased thoroughness of the work and the increased efficiency of the logging parties sent out would not be the only inducements for the use of aerial photography in the lumber industry. The lumber man would have a permanent photographic record of the condition of the tract without recourse to expensive survey or inaccurate records. He would find that the aerial map is not only more satisfactory and more quickly obtained, but it can be obtained at a lower cost than survey from the ground.

Arrangements with the Canadian air police service and lumbermen are suggested, as this would be considered preferable to the use of privately owner aircraft. This would obviate the necessity of having planes, operators and cameras. The cost of producing photographs is $4.00 per dozen. In addition to this there is the cost of the plane and the services of the aviator. If an organization, such as the Northwestern Mounted Police, is equipped with aeroplanes, service to the lumbermen could be rendered sufficiently cheaply to be a commercial proposition.



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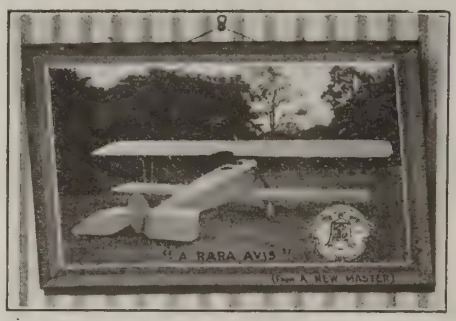
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Additional Honors Won in the Air by Americans

There follows a list of American officers who have won decorations according to the records in the War Department; whose names do not appear in the official list previously issued and published in the March 3 issue of AERIAL AGE:

Croix de Guerre

1st Lieut. Thomas P. Atkinson..Fort Sill, Okla.
Lieut. Walter L. Avery.....Columbus, Ohio
2nd Lieut. Alfred B. Baker..Washington, D. C.
2nd Lieut. Newel C. Barber...Medford, Oregon
Lt. H. St. John Boldt.....New York, N. Y.
Lieut. Alford J. Bradford.....Duluth, Minn.
1st Lieut. John Cotton.....Gallup, New Mexico
1st Lieut. Wm. B. Cowart.....Houston, Texas
2nd Lieut. D. W. Davis.....
1st Lieut. Frank A. Dixon.....Pittsburgh, Pa.
1st Lieut. Allyn M. Eddy.....New York, N. Y.
1st Lieut. Alvin C. Goodale.....Pasadena, Calif.
Lieut. James G. Hall.....Pennsgrove, N. J.
Major Melvin Adams Hall .....New York City
2nd Lieut. Bradley B. Hammond, Brighton, Mass.
Capt. E. R. Haslett.....Webb City, Mo.
2nd Lieut. Rodger W. Hitchcock,
Los Angeles, Calif.
Lieut. Alfred N. Joerg.....Brooklyn, N. Y.
Lieut. Wm. Lovett, Jr.....Los Angeles, Calif.
2nd Lieut. John C. Lumsden.....Wilson, N. C.
1st Lieut. Harold W. Merrill...Westerly, R. I.
Lieut. Russell McCormack.....Philadelphia, Pa.
2nd Lieut. Richard N. Moody
Minneapolis, Minn.
2nd Lieut. Charles L. Miller, French .....
1st Lieut. Roy K. Patterson.....Roselle, N. J.
2nd Lieut. Paul Penfield.....Detroit, Mich.
2nd Lieut. Earl W. Porter.....Atlantic, Iowa
Lieut. John I. Rancourt.....France
Lieut. Carlyle Rhodes.....Terra Haute, Ind.
2nd Lieut. Lloyd F. Schaffer...Fox Hills, N. Y.
Lieut. Vayne B. Stephenson..Bokersfield, Calif.
Lieut. Henry Stickney.....New York, N. Y.
Lieut. Sidney P. Thompson.....Ithaca, N. Y.
1st Lieut. Alwin H. Treadwell,
Poughkeepsie, N. Y.
Lieut. Fred A. Tillman.....Camp Meade, Md.
2nd Lieut. James C. Wooten...Columbia, Tenn.

Cross Legion of Honor, French

Lieut. Colonel Bert M. Atkinson..Newman, Ga.
Lieut. Colonel Lewis M. Brereton,
Washington, D. C.
Capt. Edward V. Rickenbacker..Columbus, Ohio
1st Lieut. Fred A. Tillman.....(No address)

Military Medal, British

Adj. Bert Hall, French, Pilot....New York City

District Supervisors

The offices of District Supervisors of Air Service Activities in the following named districts have been ordered abolished, effective March 31, 1919:

Eastern District,—Headquarters, O. D. M. A., Executive Section, Supervisor's Branch.

Southeastern District,—Headquarters, Montgomery, Ala.

Northeastern District,—Headquarters, Indianapolis, Ind.

Southern District,—Headquarters, Houston, Texas.

Southwestern District,—Headquarters, Dallas, Texas.

Western District,—Headquarters, Coronado, California.

The functions heretofore performed by District Supervisors will, in the future, be exercised by the office of the Director of Air Service, and by Department Air Service officers in accordance with definite instructions to be promulgated later.

Cited for Distinguished Service

The Commander in Chief, in the name of the President, has awarded the distinguished-service cross to the following-named officers and soldiers for acts of extraordinary heroism described after their names:

Second Lieut. Clinton S. Breese, observer, 12th Aero Squadron. For extraordinary heroism in action near Argonne, France, November 2, 1918. While on an infantry contact mission, Lieut. Breese and his pilot were attacked by four enemy planes and driven back, but realizing the importance of their mission, deliberately returned and attacked the four planes, sending one to the earth and driving the others away. Unmindful of the damaged condition of their plane and of their own danger, they then flew for an hour within 100 meters of the ground through a continuous heavy machine-gun fire until they had accurately located our front-line positions. Home address, R. P. Breese, father, 115 McCall Street, Waukesha, Wis.

First Lieut. Kenneth H. Holden, pilot, 12th Aero Squadron. For extraordinary heroism in action near Argonne, France, November 2, 1918. While on an infantry contact mission Lieut. Holden and his observer were attacked by four eenmy planes and driven back, but realizing the importance of their mission, deliberately returned and attacked the four planes, sending one to the earth and driving the others away. Unmindful of the damaged condition of their plane and of their own danger they then flew for an hour within 100 meters of the ground through a continuous heavy machine-gun fire until they had accurately located our front-line position. Home address, Mrs. E. M. Moran, sister, 1110 Washington Street, Michigan City, Ind.

Second Lieut. (Observer) Thomas B. Dodwell, Royal Air Forces, British Army. For extraordinary heroism in action near Bruges, Belgium, August 13, 1918. This officer and his pilot led two other machines on a long photographic mission over the area north of Bruges. Over Thourout they were attacked by six enemy planes. While heavily engaged, Lieut Dodwell and his pilot saw one of their machines in difficulty and trying to make our lines with an enemy plane close at his tail. Regardless of their own danger from the remaining planes, they dived to the assistance of the crippled plane. Taking advantage of their preoccupation, several enemy planes attacked from the rear, but, in spite of this rear attack, they drove off the enemy plane and allowed the damaged plane to land within our lines. Half of the tail plane was shot away, but Lieut. Dodwell climbed along the wing and lay down along the cowling in front of the pilot, enabling the pilot to regain partial control of his machine. When nearing the ground, he crawled back into the cockpit to allow the nose to rise, and the pilot made a safe landing. The presence of mind and cool courage of this officer saved the machine from crashing to the ground. Home address, Henry Dodwell, father, The Day House, Wellington, Shropshire, England.

First Lieut. Louis C. Simon, Jr., Air Service, 147th Aero Squadron, United States Army. For the following acts of extraordinary heroism in action near Cierges, France, September 28, 1918, Lieut. Simon is awarded a bronze oak leak, to be worn on the distinguished-service cross awarded him October 23, 1918. Lieut. Simon and two other pilots encountered nine (type Fokker) enemy planes, which were protecting an observation plane (type Rumpler). Lieut. Simon attacked the lower formation of four planes alone and drove them off. He next dived at the observation plane and set it crashing to the ground in flames. Next of kin, Mrs. M. E. Simon, mother, Normandie Hotel, Columbus, Ohio.

OCT 2 0 1919

AERIAL AGE WEEKLY

Vol. 9, No. 9 MAY 12, 1919 10 CENTS A COPY



The Statue of Liberty as seen by Aerial Cruisers on their way to the Atlantic City Aeronautic Exposition

Second Pan-American Convention Great Success

PUBLISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY
Subscription: Domestic, $4. Foreign, $6. Entered as second-class matter March 25, 1915, at the Post Office at New York, under the act of March 3rd, 1879



Aero still holds the world's altitude record

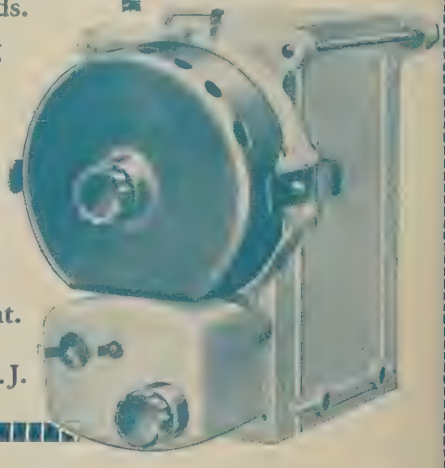
The record of 29,200 feet, established last summer by Major R. W. Schroeder at Dayton, Ohio, still stands as the world's altitude record. The Hispano-Suiza engine in his Bristol plane was fired by the Standardized Aero Magneto—which was adopted for the gigantic U. S. air program as the exclusive official magneto.

Major Schroeder gives full credit to the simplified construction, the intense spark and the absolute dependability of the Standardized Aero that nursed his supersensitive engine to a place in the world's records.

It is rumored that he will again this coming summer attempt to lower his own altitude record. And so great is his confidence in the Standardized Aero that the plane he chooses will again be driven by the same magneto which made his previous record breaking flight possible.

This is but one more gratifying testimony of the dependable performance of Aero equipment.

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SECOND PAN-AMERICAN AERONAUTIC CONVENTION GREAT SUCCESS

Winston Churchill, Admiral Lovatelli, President Menocal, Santos-Dumont and Other High International Officials Send Greetings

Important Scientific Demonstrations

THE country at large is applauding the Second Pan-American Aeronautic Convention and cables are received daily from high authorities in different countries greeting the advent of the convention.

The Hon. Winston Churchill, in a wireless to Mr. Alan R. Hawley, said:

"All good wishes for the success of the Pan-American Aeronautic Convention. May this new art and science prove a bond of kinship between the English-speaking people. The oceans have divided us. Let the air unite us. Let the air unite us in the comradeship of daring and the painstaking study of the means of mutual protection."

In opening the Convention, Secretary of War Baker sent the following wireless:

"I send greetings to the Second Pan-American Aeronautic Convention. Here in France one sees the great triumph which has been achieved in aeronautics during the war and American contribution, its value and significance."

Subsequently, Secretary Daniels sent the following wireless message:

"I regret that absence from the country denies me the pleasure of being present at the Second Pan-American Aeronautic Convention. My visits and conferences with aeronautic experts of France, Italy and Great Britain convince me that the largest field of adventure and invention lies along the line of the further complete conquest of the air. Inasmuch as the first flight was made by Mr. Wright in America, I trust that the Government of our country and the citizens of America will heartily and earnestly advance this science which means so much to mankind."

Rear-Admiral M. Lovatelli, Italian Naval Attaché, transmitted the following communication from Gabriel D'Annunzio:

"I have the honor of transmitting to you the following radiogram, which has been forwarded by Admiral Delbono, the Italian Minister of Marine: 'People of the Union, gathered together to assume the conquest of eternal Heaven today, the salutes of Italy reach you as warmly as when in that distant April you sprang up in defense of the eternal spirit of man against the menace of barbarism. In the moment of its grave grief, Italy calls upon the people of George Washington and Abraham Lincoln to present the unjust sacrifice of those who have given all for the glorious cause. People of the Star Spangled Banner, make sacred by noble



U. S. Army, Navy and Marine Corps delegates at the Second Pan-American Aeronautic Convention, photographed with the representatives of ten countries, Aero Club of America officials, Eddie Stinson and Miss Stinson, at the Atlantic City Airport. Major Reed G. Landis, second ranking American Ace, is shown next to Colonel Herr, Captain Bosc, French High Mission and Major F. F. Evans, U. S. Marine Corps are shown on the left

testimonies the day which glorifies in yourselves the most noble thing in the world, the wing of man and of liberty. Gabriel D'Annunzio.' "

The Honorable Victor Hugo Barranco, special representative of President Menocal, of Cuba, flew to Atlantic City from New York in a Curtiss aeroplane piloted by Aviator John Rolff, carrying wireless greetings from President Menocal to the Convention reading as follows:

"The marvelous progress already attained in this new field of human activity, made possible by the genius and concerted efforts of so many of your countrymen, and the brilliant part taken by American aviators in Democracy's triumph over the forces of Autocracy in the great conflict so recently brought to a glorious end, contains the promise of still greater things for the near future.

"Permit me, therefore, to again congratulate the Aero Club for its magnificent work and to offer my sincere co-operation in everything that it may be within my power to do to contribute to the success of its efforts for the extension of aerial communication between the North and Latin-American countries; such facilities will promote the advancement of culture and commerce and serve to draw still closer the already friendly ties uniting our respective countries. (Signed) M. G. Menocal."

The Royal Aero Club of Great Britain cabled the following greetings.

"We learn with pleasure of the great awakening of interest and enthusiasm for the cause of aeronautics for which our respective clubs have always worked together. We greet your airmen and wish you great success. (Signed) President, Royal Aero Club."

Mr. Alberto Santos-Dumont, the famous pioneer airman and President of the Pan-American Aeronautic Federation, who was prevented from coming to Atlantic City this month, but will come in June, cabled as follows:

"The discussion of important aspects of modern aviation, the outdoor demonstrating of aircraft and the exhibits on the Steel Pier at Atlantic City are all bound to create a popular interest in aeronautics that will certainly make for the progress of all branches of aviation. This Pan-American Convention and Exhibition is a fine thing for aeronautics, and should be productive of wonderful results. It is an important factor for developing cordial relations between the American Republics. (Signed) Alberto Santos-Dumont."

The Norwegian Aero Club cabled from Christiania, Norway, as follows:

"Please present Committee of Pan-American Flying Exposition, Atlantic City, the compliments and heartiest congratulations from Norwegian Airmen upon opening. (Signed) Norwegian Aero Club."

The Special Representatives of Chili, General Pinto and Carlos Silva, who were present at the ceremony, brought a message of greeting from the Chilian Government and the Aero Club of Chili.

Greetings were also read from Rear-Admiral Robert E. Peary, President of the Aerial League of America; President Emanuel Estrada Cabrera, of Guatemala; President Porras, of Panama; from the President of Haiti; from the Minister of Public Instruction of Venezuela; from the Minister of the Interior of Ecuador, and from Paraguay, Uruguay, Mexico, Costa Rica.

Parachute Demonstration

The first public demonstration of "Life preservers of the Air" was staged as one of the special features of the Second Pan-American Aeronautical Convention on May 3.

Lieut. Jean Ors, the noted French aeronaut, whose genius is responsible for the newest aerial safety device, ascended in an aeroplane piloted by Eddie Stinson. As the machine attained a speed of 80 miles an hour and an altitude of 500 feet over the heads of the beholders, Lieut. Ors, who occupied the seat directly behind the pilot, stepped over the cowl and leaped into space, releasing the air life preserver, which is a new type of parachute, by the jerk of the main suspending rope as he went over the side.

Stinson and his aeroplane sailed on in the straightaway. Crowds below caught the flash of Lieut. Ors' body as it was catapulted from the machine by the tremendous speed of the aeroplane. In a split second the umbrella-shaped top of the parachute spread out in a white canopy of safety over his head. Twenty-five feet below, suspended by the guide ropes leading down from the fringe of the "umbrella," Lieut. Ors' plummet-like plunge earthward was halted before he had descended fifty feet. There was no jerk. The wide spread of the parachute slowed up his descent as gradually as if brakes had been eased on slowly.

The leap was made against the sun and the sheer texture of the silk umbrella as the 18-mile wind from the south caught it, revealed the aeroplane through it. Lieut. Ors had jumped from the aeroplane just as it swung out over the waters of the Thorofare.



Major Thomas S. Baldwin, Director Atlantic City Municipal Air Port, the first air port in the world

The first to congratulate him was Engineer-Commander K. Kitishima, of the Japanese Imperial Navy, who represented his Government at the field. The Nipponese observer showed keenest interest in the construction of the parachute, while the crowds rushed up to greet the aeronaut as he released himself from the harness to which the ropes of the parachute were fastened.



Engineer Commander K. Kitashima of the Japanese Imperial Navy and Rear Admiral W. N. Little, U. S. N., retired



Lieut. Jean Ors, who demonstrated his marvelous parachute for aeroplane service



Lieut. Ors in one of his parachute descents from an aeroplane

There were two remarkable features that caught the attention of the spectators. First it was noted that of all the nations represented among the experts gathered to witness the demonstration, the United States was the only Government not represented officially. The second was the fact that the leap of Lieut. Ors had been made from a 500-foot altitude, which is a record low altitude for such a parachute test.

Ten minutes after he had finished the test, Lieut. Ors showed the practicability of the parachute for commercial purposes. Using a smaller type parachute, he swept into the air once more and released the parachute with a heavy rock attached to demonstrate how the contrivance could be employed in dropping mail bags or other packages in safety. Although the wind had freshened to twenty miles an hour, the parachute "delivered" its goods 40 feet from the designated spot, landing as gently as a feather on the grass. The drop was made from 100 feet.

The judges included the representatives of ten different nations, besides the representatives of the Aero Club of America, the Aerial League of America, the International Aeronautic Federation, the Pan-American Aeronautic Federation, the Aero Club of Pennsylvania, the Aero Club of California, the Aero Club of the Northwest, the Aero Club of Illinois, the Aero Club of Missouri, the Aero Club of Colorado, the Aero Club of Minneapolis, the Aero Club of Atlantic City, the Aero Club of Cuba, the Aero Club of Argentina, the Aero Club of Chili, the Aero Club of Brazil, the Aero Club of Uruguay, the Aero Club of France, the Aero Club of Italy, the Yale University, the Harvard University, the Pennsylvania University, Columbia University, Amherst University, University of Illinois, University of California, the Society of Automotive Engineers, the Automobile Club of Amercia, the National Geographical Society, the American Geographical Society, and other scientific and national organizations and representatives of the American and foreign press.

Lieutenant Ors won the $500 special prize for Aerial Life Preservers and may win the $500 prize offered by Mrs. Louis Bennett of New York, for the best aerial life preserver, the contest for which will last during the entire month. The prize was paid in Liberty Bonds by the Contest Committee of the Aero Club of America.

Among the officials present were: Commander H. Dons, Naval Attaché, Norwegian Legation; Lieut.-Commander A. Trindale, Portuguese Naval Air Attache; Capt. F. C. Sejerstere, Swedish Legation; Engineer-Commander K. Kitishima, Imperial Japanese Navy; Rear-Admiral W. N. Little, U. S. Navy (retired); Capt. C. Berisso, Military Attache, Uruguay Legation; Victor Hugo Barranco, Representative of Cuba; Captain Pierre Edgar Bosc, member French High Mission; General Pinta, Representative of Chili; Lieut. Edgar Henry Garland, Royal British Air Force; Capt. G. Lennstrand, British Royal Air Force; Lieut. Santiago Cavipugano, French Air Service; Major S. Herbert Mapes, of New York Aerial Police; Mr. Alan R. Hawley, President Aero Club of America; Mr. A. T. Bell, President of Atlantic City Aero Club; Mr. Henry Woodhouse, Member of Board of Governors, Aero Club of America; Mr. Charles Elliott Warren, Member of Board of Governors, Aero Club of America; Col. Jefferson De Mont Thompson, of New York Aerial Police; Mr. Augustus Post, Secretary Aerial League of America; Mr. Hugh L. Willoughby, member, Contest Committee, Aero Club of America; Mr. Fred Wagner, Official Starter; Major Reed G. Landis, second ranking American Ace, late of Air Service, U. S. A.; Mr. Edward Stinson, Aviator.

Intercollegiate Trophies

S. Raymond Beckwith, University of Pennsylvania water polo star, captured the first of a series of intercollegiate seaplane races that were a late afternoon feature over a three-mile circular ocean course off the upper beach, with the Steel Pier, headquarters of the convention, as the central point. The college boys covered a total distance of 30 miles.

The contest was particularly interesting by reason of the fact that there was a keen rivalry for the family honors between the Penn Beckwith and his brother, Ensign A. A. Beckwith, representing Yale, who finished third.

The University of Pennsylvania time was 23 minutes and 26 seconds, which gave Mr. Beckwith the first prize of $250, and he also becomes the first holder of the annual intercollegiate Trophy.

The second prize of $150 was won by Ensign M. S. Martin, with Lieut. R. M. Craigmyle, as passenger, representing Columbia University. Ensign Martin's time was 25 minutes and 13 seconds.

Ensign Beckwith, who landed Yale's colors third, won the $100 prize with a time of 26 minutes and 51 seconds, while

the fourth prize of $50 was won by Augustus Post, representing Amherst College. His time was 29 minutes and 3 seconds.

In the contest for the Intercollegiate Trophy for Land Aeroplanes, which was held at the Atlantic City Air Port, Columbia, represented by Lieutenant A. L. Smith, covered the ten laps in 10 minutes and 30 seconds, winning the first "expense money" prize of $250 and the first claim on the $2,000 trophy.

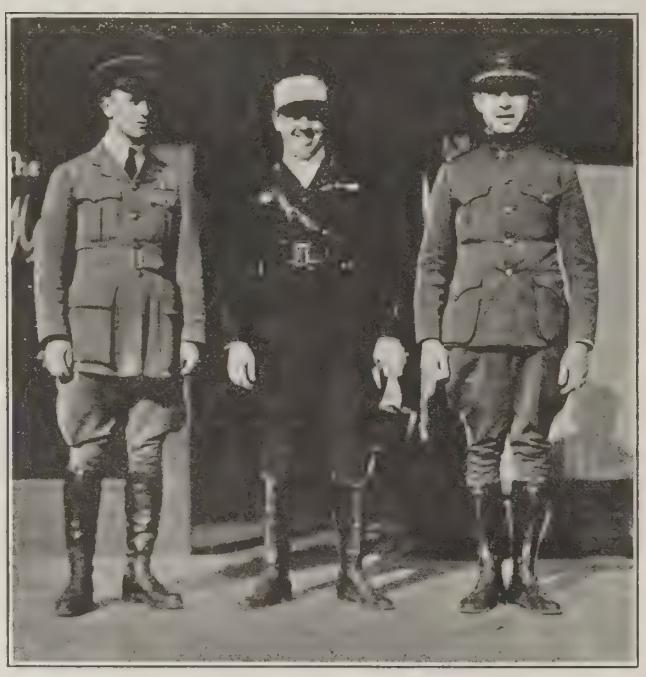
Yale, represented by Ensign Alfred A. Beckwith, covered the ten laps in 13 minutes and 35 seconds, winning the second prize.

Columbia, represented by Lieut. Guy S. Lennstrand, covered ten laps in 14 minutes and 39 seconds. Pennsylvania did not participate in this land aeroplane race.

Woman's Flying Trophy Offered

Miss Marjorie Stinson, sister of the noted aviator, Eddie Stinson, who has won a number of honors during the races of the Second Pan-American Aeronautic Convention and Exhibition, arrived at Atlantic City today and gave a number of flying demonstrations at the Atlantic City Air Port.

The interest created by her flying was great, and Mrs. May Brown Dietrich of New York, the daughter of ex-Governor Brown of Maryland, immediately offered a trophy to be



Lieut. Edgar H. Garland, Lieut. Santiago Campuzana, and Ensign A. A. Beckwith were three of the contestants

competed for annually to be known as the Women's Flying Trophy.

The trophy was offered through the Aerial League of America and a Committee is being appointed to make the rules for the competition, which will start at Atlantic City Air Port next Saturday.

Blimp Bombards Pier and Boardwalk with Victory Loan Literature

A giant "blimp" that cruised up the coast from Cap May under orders from the commander of the Fourth Naval District, "bombed" the convention hall of the Pan-American Aeronautical Congress on the Steel Pier and the Boardwalk with Victory Loan literature. The big dirigible, with a navy crew, entertained the thousands along the Boardwalk with its graceful maneuvres over the combers. Maj. Mapes, in charge of the Aviation Department of the New York Police Department, wig-wagged commands to the ship, which responded instantly to the signals as they were delivered, taking direction and executing turns as he instructed. The novel performance proved to be one of the most interesting featudes on the day's program.

Sunday Memorial Service

Dramatic was the tribute of the Second Pan-American Aeronautical Congress to the eagles of the allied nations who gave their lives in the cause of humanity. The setting was impressive when the prelude to the memorial services at the Aeronautic Hall on the Steel Pier started.



B. H. Kendrick and E. K. Jacquith, who are taking a prominent part in the competitions

Hundreds inside, sitting with bowed heads in silent prayer, suddenly heard the whirr of propellers and the throb of engines overhead, singing the eulogy of the comrades gone over the horizon to their reward. There came a soft thud on the roof of the big auditorium—another—then in quick succession came others above and at the sides of the building. A blotch of red flashed past a window near the front of the stage on which sat the international representatives. It was the guard of honor, led by Eddie Stinson, wheeling above the audience, dropping roses from the skies in memory of the valiant airmen who made the supreme sacrifice. The air patrol continued all through the meeting, while crowds on the pier decking watched and bared their heads each time the winged squadron passed over.

The services inside were presided over by Secretary Au-



Lieut. Chas. E. Ruttan, U. S. N., whose remarkable paintings are being shown for the first time on the Steel Pier



Official representatives of twelve nations who witnessed the tests of the new "aerial life preserver" used by Lieut. Jean Ors

gustus Post, of the Aero Club of America and the Aerial League of America. Mr. Post stressed the fact that self-sacrifice was the great spirit of America during the war—the spirit carried to Europe by the Yankees. He referred to the heroes whose memory the services honored today as noble examples of that spirit.

The Rev. Henry Merle Mellen, of the First Presbyterian Church, this city, who delivered the eulogy of the day, said in part:

"The dirge that we with peculiar fitness should sing at a service of this kind is suggested in Miss Adams' immortal hymn, 'Nearer, My God, to Thee.' The spiritual song writer must have had a kind of vision of these latter days, when the sons of men are so wondrously 'on joyful wing cleaving the sky.' Nay, she must have had some divinely fine sense of such men as we honor today when she continued, 'sun, moon and stars forgot, upwards I fly.'

"Cleaving the sky, these men soared to wonderful physical heights, and from the greater heights of duty and achievement took their leave of earth, kissing the ground in farewell with their bodies, while their souls winged their way to the throne of God. They ascended to the summit of heroic service and thence vaulted serenely to the realm of the Immortals. They were martyrs of the New Faith, which is not a new, but the old, perennial faith that bold souls have in the progress of the race toward higher and more spiritual achievement.

"True, they loved the adventure of the world above the sky line. They risked their lives in hazardous undertaking for the sheer peril of the thing. And probably not one of them could have given a clear-cut definition of the moral reason within him as he ascended over battlefields or training camps. Nevertheless, they have told us by their eloquent sacrifice, that it is better to die in undefined moral adventure than to live in snug, prosy platitude, hugging the earth in complacent self-satisfaction. When we draw around them the larger circle of the Great World War and its tremendous moral issues, we are justified in clothing them with the light that never was on land or sea. That light, as was said by the inspired writer many centuries ago, is 'the light that lighteneth every man that cometh into the world.' They knew that light was in them and were satisfied, even in the spirit of adventure to be guided by it. In the economy of the Divine not a single form of life is lost—never! Each spark of life adds to the onward way of progress.

W. W. Young, the first life member of the Aero Club of America, said:

"In the early days of the war Lord Kitchener, the greatest and most far-sighted general of his time, is reported to have said that an aeroplane, to him, was worth a division of troops.

"That was when aviators were merely the 'eyes of the Army.' Soon they became the teeth, the cutting edge; and these men who gave their lives were the very vanguard of Freedom.

"Before such a gift at such a cost we stand awed and helpless, but we can at least acknowledge our obligation and sympathy for those who feel, perhaps, even more than ourselves, the worth of the price paid. So I have the honor to propose this resolution:

"BE IT RESOLVED, That we, members of the Second

REGISTRY AND CLEARANCE BLANK

Atlantic City Air Port Date .....

Major Thomas S. Baldwin, Field Director
Captain Granville A. Pollock, Director of Flying

Name and Address of Pilot	Name and Address of Passenger	Place of Start	Machine Type and No.	Time Left	Time Arrived at Air Port	Time Started from Atlantic City Air Port

Remarks .....

Wind Direction and Velocity .....

Type of Motor .....

Make of Propeller .....

Make of Magneto .....

Make of Spark Plugs .....

Signature of Inspector or Observer .....

The first "Registry and Clearance Blank" for a commercial air port issued in the world

Pan-American Aeronautic Convention assembled in memorial meeting, in the Presence of Almighty God, wish most solemnly to avow our overwhelming debt to the heroic courage and devotion of those who gave their lives, through military aviation, for the purchase of our freedom."

The National Anthem was sung by B. F. Butts, and Miss Evelyn Tyson acted as accompanist. Dr. Howlett of the First Baptist Church pronounced the Benediction.

Thousands of Engineers to Attend Convention

Mr. Alan R. Hawley, President of the Aero Club of America and Chairman of the Pan-American Aeronautic Federation, received the following telegram today:

"Mr. Alan R. Hawley, Chairman Pan-American Aeronautic Federation, Hotel Chalfonte, Atlantic City, N. J.:

"Engineers' Club, Philadelphia, and affiliations three thousand strong, extend congratulations successful inauguration Atlantic City Air Port, and suggest Saturday, May 24th, be selected as Engineers' Day, your Committee requesting all Engineering Societies of America which have been invited to the Convention to be present on that date. Our Committee on Arrangements will see you next Tuesday afternoon, Air Port Field. (Signed) Lewis H. Kenney and Joseph A. Steinmetz."

It is expected that on that date not less than ten thousand engineers will be present and some startling developments in aeronautic engineering will be made public.

Insurance Policies Issued

Beginning Tuesday, May 5, every person that makes a flight at Atlantic City Airport carries a $5,000 insurance policy with his or her flight ticket.

The Managing Editor of AERIAL AGE was presented by the Aero Club of America with one of the first policies issued. Mr. Alan R. Hawley, the president of the club, in presenting it at the regular meeting of the Convention, expressed the appreciation of the Aero Club of America, the Aerial League of America, and the forty affiliated organizations for the splendid support given to the progress of aeronautics by AERIAL AGE.

This most important development in popularizing aeronautics has come as a result of requests made two months ago by the Aero Club of America and the Aerial League of America to the Insurance Companies to send experts to the Second Pan-American Aeronautic Convention to discuss the subject; and supplying these experts with facts regarding the comparative safety of aviation and air travel.

This development which was hailed with greatest interest and satisfaction by the hundreds of people assembled here for the Convention was chrystallized today by the arrival of Messrs. Charles H. Payne and J. W. Richardson, representatives of the Travelers Insurance Company with the Company's newly issued "Aviation Accident Ticket Policies", crisp and new from the presses, providing for insurance for aviators and passengers at the low rate of only fifty cents per thousand dollars. The new policies were in large demand. The first fifty policies issued were for historic and souvenir purposes to President Wilson, Secretary of War Baker, Secretary of the Navy Daniels.

First Aerial Police Arrest

New York's Aerial Police force, co-operating with the shore authorities, made the first airplane "arrest" ever recorded as one of the features of "Aerial Police Day" staged here on the program of the second Pan-American Aeronautical Convention. The "arrest" was but one of the many demonstrations of the practicability of cloud cops as a recognized department of the police force of modern cities.

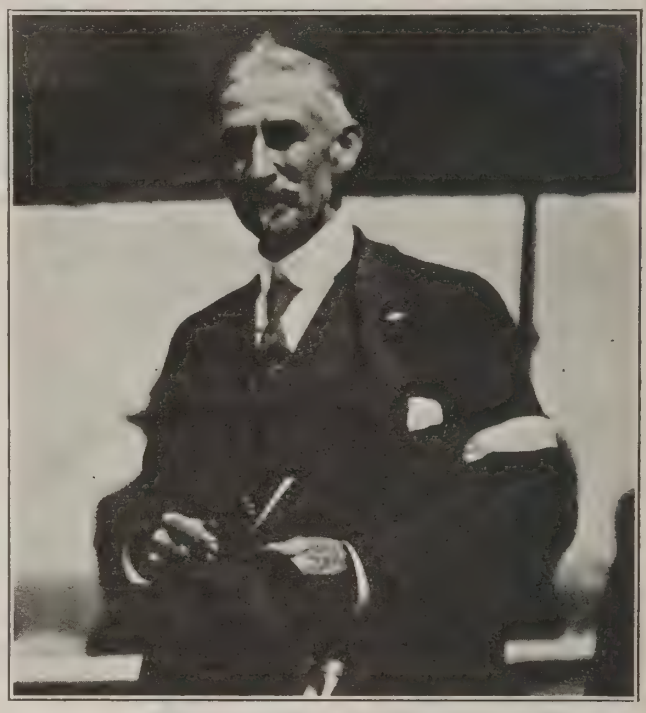
Fifteen members of the New York air force, who made their first public appearance in their sky blue uniforms, put the program through before representatives of leading cities of the east, making a big hit with their work and incidently giving the Atlantic City Air Port the honor of being the first "headquarters" in action in making an actual arrest.

Sheriff Alfred Perkins, of Atlantic County, drove to the aviation field in his automobile and left it parked near the end of the grandstand. While he was chatting with Eddie Stinson, the skyrocket among the aviators here praticipating in the meet, Richard Black, deputy of the Atlantic City Vice Squad, "stole" his automobile and started on a mad dash along the Meadow Boulevard which parallels the airport. The "thief" headed towards Pleasantville, the mainland town at the other end of the meadows five miles away.

Seizing a small Ors parachute, which had been used during the past several days to demonstrate mail bag "smashing" without the necessity of a stop, Sheriff Perkins leaped aboard the Stinson aroplane. About this time Deputy Chief S. Herbert Mapes, of the cloud force "recognized" Black as a "notorious New York Motor bandit" as the "thief" shot past the grandstand. Capt. Horace Keane, of the air division, was circling overhead in Aviator Stehlin's 'plane, and Major Mapes, operating a wireless telephone from "headquarters", shot instructions to him that the man in the automobile was "badly wanted in New York". Capt. Keane wheeled about and set sail for the mainland just as Sheriff Perkins, aboard Stinson's machine left the ground, and they took up the pursuit together.

The speeding aeroplanes beat the motor car to Pleasantville where the Sheriff dropped a message via the parachute to a traffic officer on the Shore Road over which all motor traffic must pass to get anywhere on the mainland. The policeman intercepted the speeding "thief" as he approached the crossing and placed him under arrest.

Capt. Keane descended in a field nearby and lodged a detainer with Sheriff Perkins, who had also alighted, and the two walked over to the "prisoner". County Detective Harry Fulmer "happened along" about that time and the "thief"



Capt. Hugh L. Willoughby, one of the American aeronautic pioneers, is keenly interested in all the happenings at the Convention

was turned over to him to bring back to the field. Black, handcuffed to Fulmer, was back in front of the grandstand eleven minutes after he had "stolen" the car and the first official aerial arrest was recorded at airport "headquarters".

A short time later Maj. Granville A. Pollock, wing commander of the police squadron, demonstrated an "arrest" with a seaplane capturing a motorboat "pirate" in the waterway that forms a part of the airport. The air cops later showed just how they will police "beats" established in the air, putting on a simulated wireless conversation with an express train conductor dashing across the meadows to show how trains could be intercepted between cities in case of an emergency or in getting quick aid to wrecks.

Aerial Shooting Contests

Following a conference held at the Atlantic City Municipal Airport, in which aces and prominent aeronautic authorities of nine countries participated, and at which ways and means of maintaining efficiency in shooting from aircraft were discussed, the Aerial League of America offered a trophy to be competed for annually to be known as the "International Aerial Shooting Trophy", and another trophy to be known as the "National Aerial Shooting Trophy".

In these contests the gunner will go up in an aeroplane and occupy the position of the observer. The gun is mounted on the top of the plane of the machine, so the gunner can fire upwards and sidewards; but not downward. The gunner will have ten shots and will have to try to bring down ten small free balloons painted like birds. The gunner fires at the ballons, one by one. The instant the ballon is hit, it explodes and falls. The judges watch the contest and note the

time required to bring down the ten balloons in each case. The best time made in bringing down the ten balloons will establish the championship.

Major Reed G. Landis, second ranking American ace and son of Judge Landis, who is an expert shot and is one of the champions of the idea, said: "This tournament is to be a most valuable factor in maintaining shooting efficiency and will, therefore, be of utmost importance for national defense. The competitions for this trophy will give an opportunity to the thirty thousand American aviators who have left the Army and Navy to maintain their efficiency in aerial gunnery. They will also afford training in aerial shooting to tens of thousands of marksmen and shooting experts who have not yet taken up aviation. It will be a great thing for both the nation and the individual."

The aces and aeronautic experts who discussed the aerial shooting contests included: Major Reed G. Landis, second ranking American ace; Major F. T. Evans, U. S. Marine Corps Air Service; Colonel Jacob M. Coward, U. S. Army; Colonel John K. Herr, U. S. Army, representing the Secretary of War; representatives of the Navy: Captain Granville A. Pollock, late of the Lafayette Escadrille, now in charge of the Aerial Squadron, New York Police; Colonel Jefferson De Mont Thompson, in charge of the Aviation Section, New York Police; Major S. Herbert Mapes, Captain Pierre Edgar Bosc, member of the French High Commission; Lieut. Commander A. Trindale, Portuguese Naval Air Attache; Commander H. Dons, Naval Attache, Norwegian Legation; Capt. F. C. Sejorstere, Swedish Legation; Engineer-Commander K. Kitshima, Imperial Japanese Navy; Rear Admiral W. N. Little, U. S. Navy (retired); Capt. C. Berisson, Military Attache, Uruguay Legation, Victor Hugo Barranco, Representative of Cuba; General Pinta, Representative of Chili; Lieut. Edgar Henry Garland, Royal British Air Force; Capt. G. Lennstrand, Royal British Air Force; Lieut. Santiago Compuzano, French Air Service; Mr. Alan R. Hawley, President Aero Club of America; Mr. A. T. Bell, President of Atlantic City Aero Club; Mr. Henry Woodhouse, member of Board of Governors, Aero Club of America; Colonel Charles Elliott Warren, Mr. Augustus Post, Secretary Aerial League of America; Captain Hugh L. Willoughby, Mr. Fred Wagner, W. W. Young, the noted engineer; Ensign H. D. Enger, U. S. N., late of the Lafayette Escadrille; A. S. Abell, 2d; Earl S. Ovington, Edward Stinson, the famous aviator.

The plan was first suggested by Major Thomas S. Baldwin, U. S. A.

DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

SATURDAY, MAY 10TH

AFTERNOON—Army, Navy and Marine Corps Day. Aerial contests and tournament.
EVENING—United States Army and Navy Officers' Reception. Reception and addresses at Aeronautic Exhibition Hall of the Steel Pier.

SUNDAY, MAY 11TH

AFTERNOON AND EVENING—Presentation of the flags by different States of the United States to the Aero Squadrons representing the States. Each State will present a flag to each Aero Squadron, the members of which were overwhelmingly natives of that State. The presentation will be made by representatives from the State and the Aero Club and Aerial League branch of that State. All States and cities are invited to send delegates, and the Army, Navy and Marine Corps to send representatives.

MONDAY, MAY 12TH

AFTERNOON—Demonstrations and illustrated addresses on the "Value of Aircraft for Advertising by Day and by Night." All national advertisers and advertising agents invited to attend.
EVENING—"Pan-American Aerial Transport Over Land." Addresses by members of the commissions of the 20 Latin-American Republics.

TUESDAY, MAY 13TH

AFTERNOON AND EVENING—"Pan-American Aerial Transport Over Water." Addresses by members of the 20 Latin-American Republics' Commissions.

WEDNESDAY AND THURSDAY, MAY 14TH AND 15TH

AFTERNOONS AND EVENINGS—"The Airways and Aerial Transport in Europe, Canada, Africa, Australia and Asia."

FRIDAY, MAY 16TH

AFTERNOON AND EVENING—"Aerial Navigation Instruments for Flying Over Land and Water." Aviators, navigators, scientific instrument makers and aeronautic experts invited.

SATURDAY, MAY 17TH

AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.
EVENING—Ball.

SUNDAY, MAY 18TH

AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH

AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."
EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH

AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST

AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.
EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22ND

AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can Be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Topographic and Climatic Factors in Relation to Aeronautics."

FRIDAY, MAY 23RD

AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulations of Air Traffic." (First day). Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH

AFTERNOON—Races and contests.
EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH

EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK

MONDAY, MAY 26TH

EVENING—"Aeronautic Engineering Problems and Their Prospective Solution." Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH

EVENING—"Factors That Increase the Efficiency for Large Dirigibles." "Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH

AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."
EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH

AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."
EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)

AFTERNOON—Aircraft contests.
EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST

AFTERNOON—Aircraft contests.
EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST

AFTERNOON AND EVENING—Award of prizes and diplomas for all events.

TROPHIES AND PRIZES TO BE COMPETED FOR AT ATLANTIC CITY IN MAY

THE following Trophies and Prizes have been offered for competition at Atlantic City, and from other points to Atlantic City from May 1st to May 31st. All contests are open to Army, Navy, Aerial Mail and civilian aviators.

(1) **$6,000 Curtiss Marine Flying Trophy.** Mr. Glenn H. Curtiss has offered a prize of $1,000 to go to the first entrant for the Curtiss Marine Flying Trophy who covers the distance of 1,000 miles without stopping. The contest for this prize will open on May 1st, and continue until it has been accomplished.

The entrants who wish to compete for this trophy and prize during the Convention can fly over the 60-mile course between the Steel Pier and Cape May Air Station. This magnificent trophy is exhibited at the Art Salon on the Steel Pier.

The entrant's record will be counted as a flight for the Curtiss Marine Flying Trophy and $1,000 under the rules for the 1919 competition for this trophy.

(2) **The $5,000 Pulitzer Trophy,** offered for annual competition, to be awarded this year to the aviator who makes the best record in flying land or water planes from anywhere to Atlantic City, and from Atlantic City to anywhere during the month of May.

Competitors for this trophy will start from or end at the Atlantic City Air Port, on Albany Avenue, Atlantic City, which affords unsurpassed facilities for both land and water aeroplanes.

(3) **The Boston Globe Trophy and $1,750** cash prizes to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record in flying from Atlantic City to Boston, or from Boston to Atlantic City during the month of May; $500 and $250 to the aviators who make the second and third best records, respectively.

Start or ending will be on the Atlantic City Air Port.

(4) **The Cleveland Plain Dealer Trophy and $1,750** cash prizes to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record flying from Atlantic City to Cleveland, or from Cleveland to Atlantic City during the month of May; $500 and $250 to the aviators who make the best records, respectively.

Start or ending will be on the Atlantic City Air Port.

(5) **The Detroit News Trophy and $1,750** cash prizes to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record flying from Atlantic City to Detroit, or vice versa, during the month of May; $500 and $250 to the aviators who make the best records, respectively.

Start or ending will be on Atlantic City Air Port.

(6) **The Atlanta Journal $1,750 prizes,** to be awarded to the three aviators who make the best record flying from Atlantic City to Atlanta, Georgia, carrying the Journal.

Start or ending will be on Atlantic City Air Port.

(7) **Colonel William A. Bishop's "Ace of Aces Trophy,"** to be awarded to the aviator who makes the best record in flying from Toronto to Atlantic City, or vice versa, during the month of May.

Start or ending will be on Atlantic City Air Port.

(8) **The $3,000 New York Herald Aero Efficiency Prizes,** to be awarded as follows: $1,000 to the aviator who covers the greatest distance in a non-stop cross country flight, starting from or ending at Atlantic City between May 1st and May 30th with an aeroplane of any horsepower.

$250 to each of the aviators who cover the greatest distance in a non-stop flight from or ending at Atlantic City between May 1st and May 30th with aeroplanes of:

(a) not over 100 h.p.
(b) not less than 100 h.p. and not over 200 h.p.
(c) not less than 200 h.p. and not over 400 h.p.
(d) not less than 400 h.p. and not over 600 h.p.
(e) not less than 600 h.p. and not over 800 h.p.
(f) not less than 800 h.p. and not over 1000 h.p.
(g) not less than 1000 h.p., and over without limit.

Start or end of flight will be on Atlantic City Air Port.

(9) **$2,000 Intercollegiate Seaplane Speed Trophy,** for annual competition, to be awarded to the college whose representative makes the best record in flying ten times over a five-kilometer course at Atlantic City each Saturday off the Steel Pier during the month of May.

This trophy is to become the property of the college that wins it three years in succession.

(10) **$2,000 Intercollegiate Aeroplane Trophy,** for annual competition, to be awarded to the college whose representative makes the best record in flying ten times over a five-kilometer course at Atlantic City each Saturday during the month of May. To be held at the Atlantic City Air Port.

This trophy is to become the property of the college that wins it three years in succession.

(11) **$2,750 Cash Prizes for Intercollegiate Weekly Seaplane Races,** offered under the terms of the will of Mr. Samuel H. Valentine. These prizes are to be awarded in connection with the races for the Intercollegiate Seaplane Trophy described above. They are offered to assist the collegiate aero clubs and individuals making the entries to defray the expenses connected with entering a team. Competing for same will not, therefore, endanger the amateur status of the competitor.

There will be four prizes awarded each Saturday for the best speed made in competition for the annual Intercollegiate Seaplane Trophy as follows:

First prize	$250
Second prize	150
Third Prize	100
Fourth Prize	50

Colleges are permitted to appoint new entries and enter different machines for each race. The name of the entrant and type of machine need not be announced until half hour before the race.

(12) **$2,750 Cash Prizes for Intercollegiate Weekly Aeroplane Races,** offered under the terms of the will of Mr. Samuel H. Valentine, are to be awarded in connection with the weekly races for the Intercollegiate Aeroplane Trophy described above. They are offered to assist the collegiate aero clubs and individuals making the entries to defray the expenses connected with entering a team. Competition for same will not endanger the amateur status of the competitors.

There will, therefore, be four prizes awarded each Saturday for the best speed made in competition for the Annual Intercollegiate Aeroplane Trophy, as follows:

First Prize	$250
Second Prize	150
Third Prize	100
Fourth Prize	50

Colleges are permitted to appoint new entries and enter different machines for each race. The name of the entrant and the type of the machine need not be announced until half an hour before the race.

(13) **The Intercollegiate Dirigible Trophy.**
This may not be held until later in the season.

(14) **The Intercollegiate Balloon Trophy.**
This may not be held until later in the season.

All of these contests, except the intercollegiate, are open to Army, Navy, Marine Corps, intercollegiate and civilian aviators. The rules are similar, so that a competitor can compete for more than one trophy in one flight.

The intercollegiate contests are open to both graduates and undergraduates.

(15) **Open Seaplane Speed Contests** (with handicap) for twelve laps of five miles each. To be held on Decoration Day. Prizes to be awarded under the terms of the will of Samuel H. Valentine and sanctioned by the Aero Club of America.

First Prize $1,000
Second Prize 500
Third Prize 250

(16) **Aerial Commuting Prizes.**

1. To be awarded to entrants who cover the greatest total distance in commuting by air from anywhere to Atlantic City during the period of the Convention.

First Prize .....Gold Medal
Second Prize .....Silver Medal
Third Prize .....Bronze Medal
(Distance to be measured in straight line.)

2. To be awarded to entrants who make the greatest number of trips in commuting by air from anywhere to Atlantic City during the period of the Convention.

First Prize .....Gold Medal
Second Prize .....Silver Medal
Third Prize .....Bronze Medal

3. To be awarded to entrants who make the longest flight in commuting from anywhere to Atlantic City during the period of the Convention. (Distance to be measured in straight line.)

First Prize .....Gold Medal
Second Prize .....Silver Medal
Third Prize .....Bronze Medal

(17) **$2,000 Opening Day Prizes,** offered under the terms of the will of Samuel H. Valentine for land aeroplanes and seaplanes. To be awarded to the aviators making the best records in competing for any of the trophies and prizes on May 1st, flying from Atlantic City to anywhere, and from anywhere to Atlantic City. Competitors starting from Atlantic City will start from the Municipal Air Port at Albany Avenue, Atlantic City. Competitors from other points will end their flights at the Air Port.

(18) **$500 Aerial Runabout Races,** offered under the will of Mr. Samuel H. Valentine for speed competition between one-seater aeroplanes of not over 75 h.p. Two races are to be held as follows:

First race, Saturday, May 10th, at the Atlantic City Air Port, Albany Avenue, Atlantic City:

First Prize $250
Second Prize 150
Third Prize 100
Fourth Prize 50

(19) **The Akron Trophy,** presented by Major Thomas S. Baldwin, to be presented to the pilot who makes the best time with any type of aircraft in flying from Akron to Atlantic City, or Atlantic City to Akron, during the month of May.

Start or landing must be made on the Atlantic City Air Port.

(20) **$100 West Point Merchants' Association Prize,** to competitor of Pulitzer Trophy who starts from or ends at West Point, Mississippi.

(21) **Woman's Trophy for Flying,** offered by Mrs. May Brown-Dietrich, through the Aerial League of America, for competition by women under rules to be drawn by the Contest Committee.

Record of Competitors

MAY 1st CONTEST:

ROLAND ROHLF. Hon. Victor Hugo Barranco, passenger. 90 h.p. Curtiss "Oriole" Biplane, from Westbury, Long Island, to Atlantic City Air Port, 118 miles; two hours and eight minutes. Return flight, one hour and twenty-five minutes. Both flights in driving storm.

EDDIE STINSON. Lieut. G. W. Shaw, U. S. N., passenger. 90 h.p. Curtiss Biplane, from Queens, Long Island, to Atlantic City Air Port; two hours, thirty-three minutes, in driving storm.

E. K. JACQUITH. 90 h.p. Flying Boat from Atlantic City to Rockaway Naval Air Station in driving storm; one hour, forty-five minutes.

B. H. KENDRICK. 90 h.p. Flying Boat, from Atlantic City to Newark, in driving storm; two hours.

MAY 2nd CONTEST:

B. H. KENDRICK. 90 h.p. Flying Boat, from Newark to Atlantic City; two hours, fifteen minutes.

E. K. JACQUITH. 90 h.p. Flying Boat from New York to Atlantic City; two hours, twelve minutes.

MAY 3d:

A. LIVINGSTON ALLEN, with John P. Davis as passenger, flew from Roosevelt Field, Long Island, to Atlantic City Air Port in one hour, twenty minutes.

In all Intercollegiate Contests the entries must be either undergraduate or graduates of their respective universities holding the pilot certificate issued by the Aero Club of America, under the rules of the International Aeronautic Federation.



The N. C. 4 Trans-Atlantic Cruiser being put in shape for the first leg of the journey at Rockaway



THE NEWS OF THE WEEK



50,000 See Airship Shot Down By Foe in Mimic Battle

Fifty thousand persons watched the great mimic battles in Van Cortlandt Park getting the most thrilling and vivid picture of how and why the Hindenburg line crumbled under the pressure of American fighters.

One thrilling incident was when an observation balloon was sent up two thousand feet to report the "enemy" doings and fire from the "enemy" hit the envelope and set the balloon afire. Instantly its pilot was seen to jump off the basket, and as he did a large parachute opened up and carried Lieutenant Herbert H. Mills, of the Twenty-second balloon company, safely to the ground. This was the signal for the afternoon battle to start.

Aerial Police Visit Philadelphia

Aero policemen of New York City, the first city in the world to introduce "fly' cops in the highest sense of the word, made their pioneer extended flight Tuesday afternoon, carrying greetings from Mayor Hylan to Mayor Smith of Philadelphia.

Two Curtiss JM-4D training planes, piloted by A. Livingston Allen and Joseph D. Bennett, lieutenants in the Aerial Police Reserve, carried Police Inspector John F. Dwyer of the New York Police, and Major Dinshah P. Chadiali, governor of the Wanamaker Aviation School, from Sheepshead Bay to Philadelphia.

The aviation school of the Police Reserve was founded by Special Deputy Police Commissioner Rodman Wanamaker with a view of training aviators for the Government while the war was going on. It will be used in the future to train aviators for the police department.

"It will only be a short time until aerial traffic policemen will be on duty in the air over New York City," said Commissioner Wanamaker, "to control and regulate traffic."

The use of the machines was donated by J. P. Davies of the Curtiss Aeroplane & Motor Corporation.

Good Landing Club Will Aid U. S. Fliers

An informal tea marked the opening of the Good Landing Club at 114 East Thirty-ninth street, on May 4 by the Treasure and Trinket Fund Committee of the National Special Aid Society. After the club had been formally opened the keys were turned over to the officers by the Fund Committee treasurer.

Among the ladies who will serve on the committee are Mrs. William Allen Bartlett, chairman of the aviation committee; Mrs. Edward Robinson, chairman of the house committee; Miss Fredrica F. Winfield, secretary, and members of the priority board.

The Treasure and Trinket Fund was



N. C. 3 Flying Boat being launched at Rockaway Point Naval Air Station preparatory to the Trans-Atlantic flight. The insert shows Commander J. H. Tower, who will be in charge of the three flying boats, the N. C. 1, N. C. 3, and N. C. 4



The N. C. 4, which at the time of our going to press, is awaiting favorable weather conditions to start from Rockaway on the Trans-Atlantic flight



The Trans-Atlantic Cruiser N. C. 3, equipped with 4 Liberty Motors, waiting at Rockaway for the hop to Newfoundland



Thomas-Morse type MB-3 single-seater fighter, equipped with 300 H.P. Hispano-Suiza engine. Span, 26′0″, length overall, 20′0″, height, 9′1″. Total weight loaded, 2050 pounds. Fuel and oil capacity for three hours' flight at full power. High speed—163 2/3 M.P.H., climb to 10,000 feet in 4 minutes 52 seconds

established to meet the needs of our air service, the welfare of the dependents in the case of disaster and the long list of the flyer's wants. The fund also provides the necessary equipment and comforts not yet furnished by the Government.

Big Aerodrome and Wireless for League Capital

The first meeting of the League of Nations in Geneva as the capital will be held in the famous Alabama Hall of the City Hall, it is learned.

The local authorities have been notified that a site one and one-half miles square on the lake shore will be required for the permanent home of the League, and several such sites have been offered by old families of Geneva.

The most powerful wireless station in the world will be constructed here, and also a huge aerodrome for diplomatic aeroplanes, all of which will be extra-territorial. The local authorities are giving every assistance.

Albuquerque Has Aerial Landing Place

Albuquerque, N. M.—Realizing the possible value of aircraft in the patrol of cattle and sheep ranches, the protection and survey of forests and the carrying of mail, the city of Albuquerque which in co-operation with the Albuquerque Aviation School, has prepared the best landing field in the southwest, comprising about forty acres of ground at the terminus of the street railway and the electric light service on the outskirts of the city. The establishment of this field has been brought about by the progressive work of the local Chamber of Commerce.

Dr. Poor Describes Aerial Navigation Instruments

Washington, D. C.—Dr. Charles Lane Poor on April 29 described the computing machine which he developed for the solution of navigation problems encountered in aerial navigation, before the National Academy of Science.

With this instrument the calculations are actually performed with a few direct, simple movements, and with an accuracy equivalent to that with four-place logarithmic tables. In principle this instrument is essentially a circular slide rule. Its accuracy is sufficient for "off shore" navigation on board ship and is ample for any work on aeroplanes or airships.

Enid, Oklahoma, Has Municipal Aerial Landing Field

Enid, Okla., April 30.—A municipal aerial landing field has been established at this city, as a result of the work of the Chamber of Commerce. A cement circle, ten feet in diameter, has been laid to attract the attention of airmen.

An aeroplane sales agency was established here several weeks ago, and two Curtiss JN-4D planes were sold within one week.

The landing field and hangars have been completed since April 18, and is claimed to be the second municipal landing field to be established in the United States.

Aeroplane Courier Procures Passports on Time for Mexican Trade Delegation

San Antonio, Texas—The Mexican Trades Delegation, composed mostly of Texas business men, making a tour of Mexico for the purpose of encouraging and arranging for trade relations, had assembled in San Antonio under the direction of the Chamber of Commerce. All arrangements had been completed late Friday night and the party had boarded the special train on the I. & G. N. R. R., which was to take them on their pilgrimage, when it was discovered that nine of the passports had not arrived. Telegraphic permission was secured immediately, pending receipt of the passports, and the train started for the border.

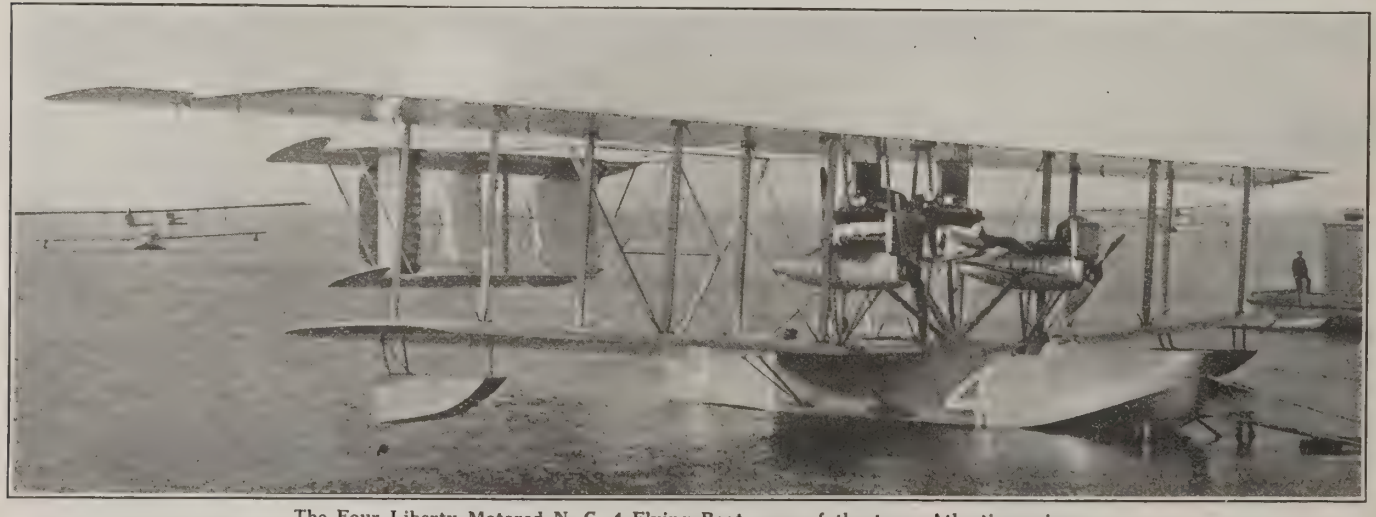
Saturday morning the Secretary of the Chamber of Commerce called up Kelly Field, explaining the situation and stating that the passports had been received from the State Department, in Washington, and asking if it would be possible to dispatch a courier by aeroplane with the missing documents.

Colonel Fechet, Commanding Officer of Kelly Field, immediately responded, and at two o'clock Lieutenant H. S. Kenyon, accompanied by a mechanic, left by plane for Laredo. Owing to heavy clouds, and to the smallness of the landing field at Laredo, Lieutenant Kenyon was forced to use a Curtiss JN-4 Canadian, equipped with a four-hour tank, in the face of a twenty-mile wind. The 150-mile trip was made in remarkably good time, three hours and twenty minutes. The passports were delivered to the Custom Officer and the Trade Delegation was free of all encumbrance.

The return trip was completed in two hours and twenty minutes, Lieutenant Kenyon flying at a higher altitude and taking advantage of a thirty-five-mile wind.

Six Columbia Airmen Chosen for Contests

Six men were elected yesterday, at a meeting of the Columbia Aero Club, to represent Columbia University in the intercollegiate flying contests to be held at Atlantic City. They are Ronald M. Craigmyle, Guy S. Lennstrand, E. L. Smith, M. S. Martin, A. L. Tait and M. G. Spooner. They will have two planes and will be divided into two crews. Columbia will compete for the Pulitzer Trophy.



The Four Liberty Motored N. C. 4 Flying Boat—one of the trans-Atlantic cruisers

The AIRCRAFT TRADE REVIEW

American Railway Express to Establish Aerial Service

Mr. R. E. M. Cowie, Vice-President of the American Railway Express Company, made definite announcement to the effect that his company is prepared to establish regular aerial express service between New York and Chicago. Mr. Cowie has pointed out the possibilities of such a service, which will be found invaluable in transporting with the greatest possible speed emergency articles and light important express matter.

This service can be used to advantage when, for instance, medicinal or surgical articles are required without delay. Important papers and documents can be quickly transported by aeroplane when it sometimes becomes imperative that they reach a certain destination a day or two ahead of the fastest existing mail service. Another phase in which the plane service would be economical would be in bringing from some distant city small pieces of machinery or mechanical apparatus to replace or repair machinery the failure of which to operate would mean that hundreds of men might be idle until the repair could be made.

Commercial transportation will divide itself into three parts—passenger carrying, postal service and express service, and in its policy of progressiveness the American Railway Express Company is to employ the aeroplane as being the next advance in express service.

The Company does not contemplate the outright purchase of planes, but is willing to negotiate immediately with companies establishing regular flight service between far-distant cities to carry articles handled by the American Railway Express Company.

Personal Pars.

The Black & Decker Mfg. Co., of Baltimore, Md., have established a New York office, Room 2920, Equitable Building, in charge of Mr. G. R. Lundane, who will supervise the distribution of Black & Decker products in New York City and surrounding territory, including the State of Connecticut. Mr. Lundane was previously eastern district salesmanager for the manufacturers of Rayfield carburetors.

Percy F. Todd, who was connected with the engineering division, Bureau of Aircraft Production, at Detroit, Mich., is now with the tractor division of the General Motors Co., of that city.

Matthew C. Ditman, who had active charge of the affairs of the American Bronze Corporation, Berwyn, Pa., while its president, John W. Watson, was in Government service, has been relected vice-president and treasurer, and in addition appointed general manager.

William F. Parish, manager of the lubrication division of the Texas Co. and lately chief of the oil and lubrication branch, Air Service, has been appointed technical director of the Sinclair Refining Co., of Chicago, Ill.

F. Leroy Hill has severed his connection with the aeroplane engineering division, Bureau of Aircraft Production, and is now located at Berkeley, Cal.

H. L. Greene has been appointed chief metallurgist of the Willys-Overland Co., Toledo, Ohio, and its allied companies. He was formerly chief metallurgist of the Canadian branch of the organization, the Willys-Overland, Ltd.

Frank King has resigned as aircraft engineer, Wright-Martin Aircraft Corporation, New Brunswick, N. J., and is now associated with the Columbia Grafanola & Dictaphone Co., Fairfield, Conn.

The Curtiss "Oriole" a Commercial Plane

Immediately after the signing of the armistice, the Curtiss Aeroplane & Motor Corporation directed the energies of its designers toward the development of aircraft designed to meet commercial needs.

The "Oriole," designed by W. L. Gilmore, aeroplane engineer for the Curtiss Engineering Corporation at Garden City, L. I., is the first post-bellum aeroplane designed primarily for the comfort of passengers—the first plane which is not a war adaptation.

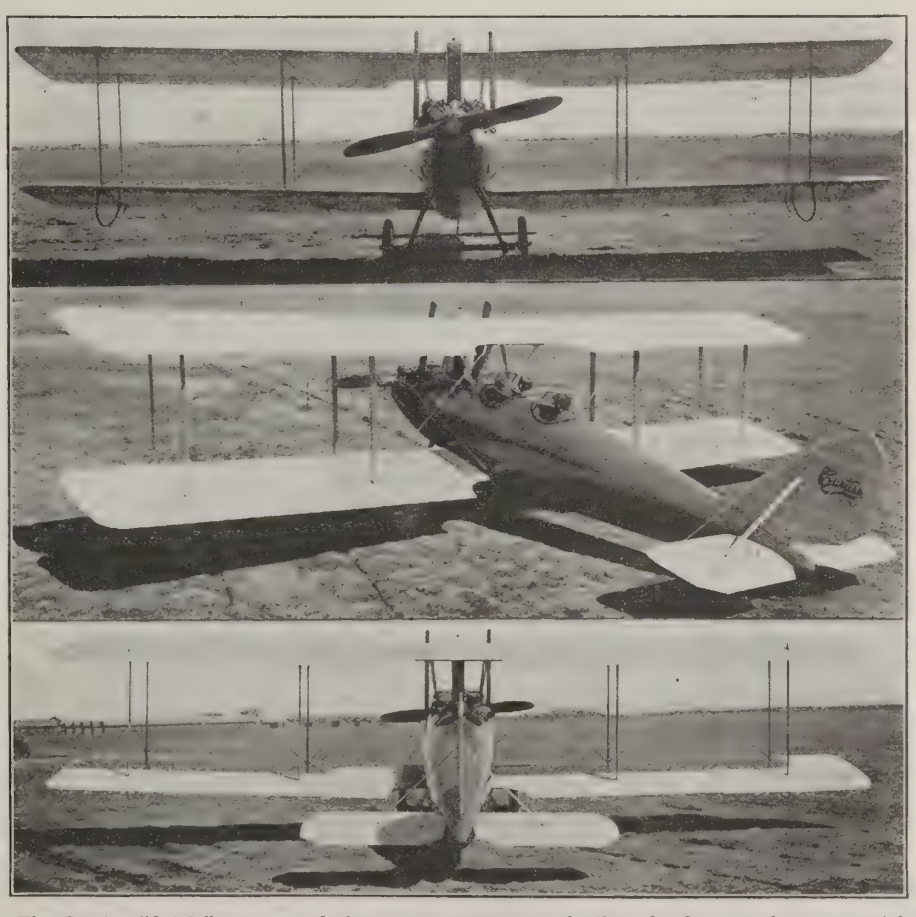
It is a three-passenger biplane, the fore cockpit being commodious enough for two passengers seated side by side. All the controls are in the rear cockpit.

It embodies a new idea in construction of the fuselage or body which is of special wood-ply, made in two parts and connected on the center line. Longitudinal stringers, running fore and aft, aid to rigidity. It is elliptical in section and it contains no real diaphrams.

The upholstering in the passenger's cockpit is made of the finest leather and the curved windshield protects the occupants and gives them a clear vision while flying.

It is colored like the oriole, after which it has been named, the body being orange, the wings yellow and black. It is equipped with the Curtiss OX-5 motor which was used exclusively in the JN-4D training planes in which most of the American and Canadian aviators were trained.

It is 25 feet long, 36 feet from tip to tip and is 9 feet 5 inches in height. Its total weight loaded is 2,188 pounds and carries a useful load of 767 pounds. It has a maximum flying speed of 85 miles an hour, and a landing speed of approximately 40 miles an hour.



The Curtiss "Oriole", accommodating two passengers and pilot, the first purely commercial machine to be produced in America

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative



PILOTS

Dana C. DeHart
Edward V. Gardner
Robert F. Shank
Ira O. Biffle
Leon D. Smith
Gilbert G. Budwig
Trent C. Fry

PILOTS

E. Hamilton Lee
Lester F. Bishop
Carroll C. Eversole
Charles I. Stanton
John M. Miller
Max Miller
Charles E. Bradley

John A. Jordan, Superintendent, Western Division
Paul L. Ferron, Manager, Belmont Park
Harry W. Powers, Manager, College Park
Lowell S. Harding, Manager, Bustleton
O. J. Sproul, Manager, Chicago
W. J. McCandlass, Manager, Cleveland

Bureau of Aircraft Development Favored by Postal Officials

Washington, D. C.—The creation of a bureau of aeronautical development, which would have charge of inventing and designing aircraft and appliances for all branches of the Government, rather than a department of military aeronautics, which would have charge of the operation of aircraft as well, is favored by the Post Office Department, as a means of advancing the aeroplane mail service.

Such a bureau, in the opinion of post office officials, should be independent of any government department, the personnel aeronautical engineers familiar with the requirements of all branches of the government dealing with aeronautics, including the Army, Navy and Post Office Department.

The concentration of all development work in one Bureau familiar with the requirements of all branches of the Government would result in more efficient design and more rapid development, according to postal officials. Duplication of effort would be avoided and application of experience gained to all problems would be assured.

Cairo-Karachi-Bombay to Be First Public Postal Aero Mail Line for England

London.—The first regular aero-mail service in the British Empire available for unofficial letters will shortly be started between Cairo, Karachi, and Bombay. Postal arrangements are nearing completion, and in due course, it is stated, an announcement fixing rates will be made. Letters from Great Britain for the Indian aero-mail will have to be marked "Express—Air Service," and an express fee, probably of two or three shillings, will be charged. The likelihood of frequent interruption by fog and other atmospheric conditions is regarded by the postal authorities as a fatal bar to the introduction of any regular aerial mail services in the United Kingdom.

Daily Aero Mail Service Between Avignon and Nice in Operation

A daily postal service has been started between Avignon and Nice. From now onward an aeroplane will be ready to carry mails for Nice left at Avignon by the Paris-Lyons train which arrives at midnight. A machine will also deliver mails from Nice at Avignon in time for the midnight train for Paris. A regular postal service by aeroplane is also announced between Rabat (Morocco) and Algiers.



Dana C. DeHart, known among the Aerial Mail pilots as "Daddy"

Aerial Mail Records Being Made in France

The Paris-Bordeaux aerial mail route is now in regular operation. The best time made so far is 3 hours 40 minutes in a Salmson postal biplane piloted by Lieut. Chretien and Lieut. Gibot. This time was equaled by Adjutant Rachot in a Bordeaux to Paris flight.

On March 25th Adjutant Patin, carrying four bags of mail and 1,200 telegrams, covered the distance from Lille to Paris in one hour.

The Paris-St. Nazaire aerial mail route is in regular operation. Adjt. Mohr made a record when he flew Paris-Le Mans and return (250 miles) in 2 hrs. 35 mins.

The French Africa, the first military postal machine from Casablance arrived at Tangier at 11 o'clock on March 19th. The journey took 5 hrs. A regular service is in operation between Tangier and Rahat.

Peruvian Postmaster - General Seeks American Aid for Aerial Mail

The Postmaster-General at Lima is asking for offers from European and American firms for establishing an aerial mail service.

Dana C. De Hart, Aerial Mail Pilot, has been flier since 1911

Dana C. De Hart, known among aerial mail pilots as "Daddy," was born in Los Angeles, California, on June 17, 1886. He learned to fly in a pusher machine, without any dual instruction, in the early part of 1911, passing the Aero Club of America tests a few months later and receiving pilot's certificate No. 129. He made some early experiments with wireless telegraphy on aeroplanes, and during 1911-1912 instructed and flew exhibitions for Eaton Bros., Hyde Park, Cal. One of his students was Tom Gunn, the first Chinaman in the world to become a licensed flier, and who is now head of the Chinese flying service. Mr. De Hart later entered the automobile business at San Jose, Cal., and did little flying for three years. When the country took part in the war he went to San Diego, Cal., and became a civilian flying instructor for the army, being advanced from a junior to a senior instructor. On August 19, 1918, he was employed by the Aerial Mail Division, and has been a consistent, all-weather pilot, never failing to attempt a flight, no matter how serious the elements. He is also in charge of compass work on the Washington-New York route.

Seaplane in Flight for Victory Loan

In the interest of the Victory Loan, a hydroplane carrying three passengers flew from Albany to Keyport, N. J., making the 180 miles in two hours and fifteen minutes flying time. Incidentally, the trip provided data to be used in opening the proposed Hudson River air line.

The 'plane, a product of the Aero-marine Plane and Motor Company, left the water in front of the Albany Yacht Club. The first stop was made at Poughkeepsie, which was reached fifty minutes after the start. At Keyport the three passengers, Pilot C. J. Zimmerman, Mechanic Richard Greisinger and M. Mack Nomburg, were taken ashore at the Aeromarine factory.

Japanese Air Student Flies in Mail Plane

Ukitern Ozaki, son of the former Japanese Minister of Justice, made a flight from Washington to Belmont Park, completing the trip in two hours and twenty minutes. He was piloted by L. D. Smith, air mail pilot, who brought the mail from Washington. The young Japanese, who is here to study air navigation, enjoyed the journey from the capital, and said it taught him much.

THE SIDDELEY-DEASY "PUMA" AERO ENGINE

THE design of the Puma engine was started in January, 1917, and the first experimental model was completed in the following March. By the end of the autumn the engine was being produced on a quantity basis, and by the signing of the Armistice more than 625 engines had been delivered, in addition to a vast number of spare parts.

This engine, designed and manufactured by the Siddeley-Deasy Motor-Car Company, Limited, of Coventry, is of six cylinders, whose bore and stroke are respectively 145 m.m. and 190 m.m., giving a total cylinder capacity of 18.8 litres. The two outstanding features of this engine are the construction of the cylinders and the arrangement of the mechanism actuating the valves; these features not only give this power unit a decidedly distinctive and handsome appearance, but greatly facilitate the dismantling and erection of the engine for any such repairs as are likely to become necessary, and render the successful maintenance of the engine a comparatively simple matter even by mechanics possessing no very great skill or experience.

The cylinders consist of a thin steel liner, forming the working barrel, which is mounted in an aluminium casting forming the cylinder heads, water jackets, valve passages, and inlet manifold; these aluminium jackets are cast in two separate units, each of which contains three cylinders. Near the level of the combustion chamber these jackets are divided, in a horizontal plane, into two portions, the joint being made by a number of bolts; leakage of water at the base of the aluminium jacket is entirely prevented by a rubber ring which is pressed against a shoulder on the steel liner by the castellated ring-nut screwing into the jacket; the general arrangement of these cylinders is shown in Fig. 1.

The cooling water is introduced at the top of the rearmost cylinder-jacket, and is uniformly distributed over the several cylinder heads and valve passages by an aluminium pipe running through the whole of the blocks of the cylinders; the water ultimately makes its escape near the top of the foremost cylinder jacket. The cooling of the lower portions of the cylinder barrels is effected by convection, and by turbulence arising from the rapid motion of the water through the top of the jacket.

The valve seatings are not cut directly upon the aluminium heads of the cylinders, but upon bronze rings which are expanded into the aluminium.

The heads of the cylinders are flat, and each carries one large inlet valve and two smaller exhaust valves. The exhaust valves are of tungsten steel, and each is held against its seating by a single volute spring; the inlet valves are of nickel steel, and each is provided with two telescopic helical springs. Adjustment of the valve clearance may be rapidly effected by means of a large diameter cap which screws on to the stem of each valve. The operating mechanism of the valves is unusual;

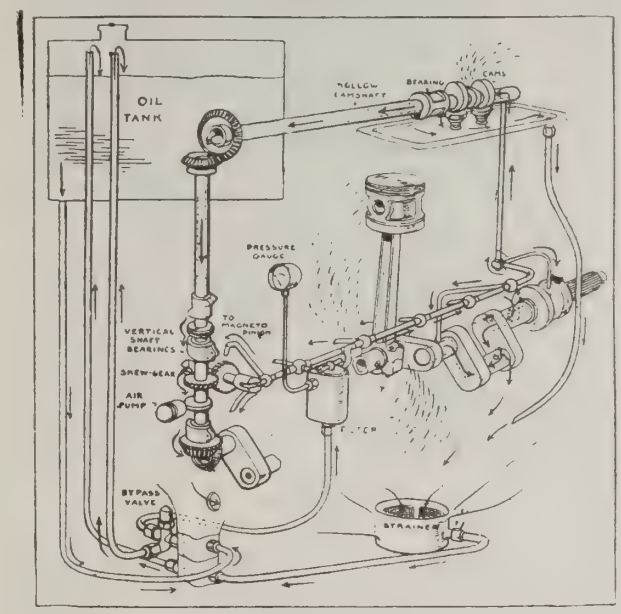


Fig. 2—Showing oil circulation of Siddeley-Deasy "Puma"

the camshaft is carried immediately above the exhaust valves, nothing beyond the aforementioned adjustable cap being interposed between these valves and their respective cams; the inlet valves are each operated through the agency of a small rocking lever, whose fulcrum is supported from the top of the camshaft housing.

The camshaft is carried in four large bearings carried in the camshaft housing; this housing is cast in aluminium, and is well provided with inspection doors, two of which are arranged upon each side of the engine; the whole of the valves and their gear are enclosed and their complete protection from the weather assured.

The pistons are die-cast from an aluminium alloy, and each carries three cast-iron rings near the head and a scraper ring

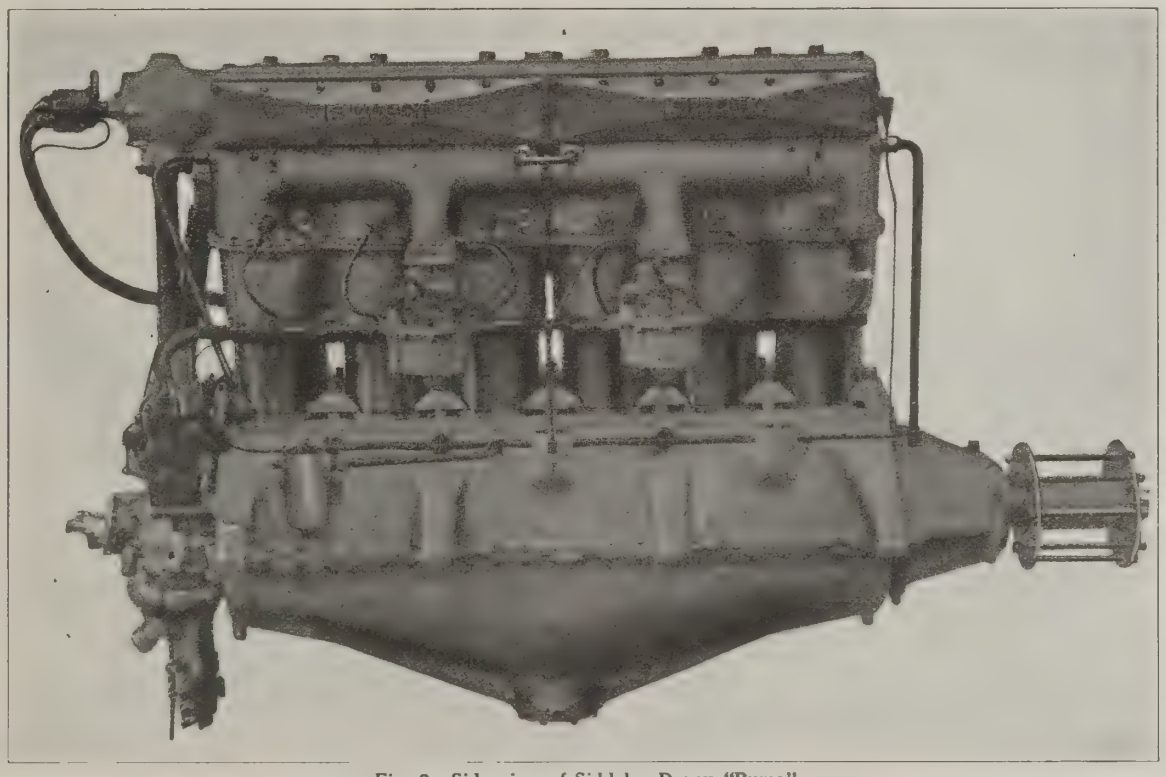


Fig. 3—Side view of Siddeley-Deasy "Puma"

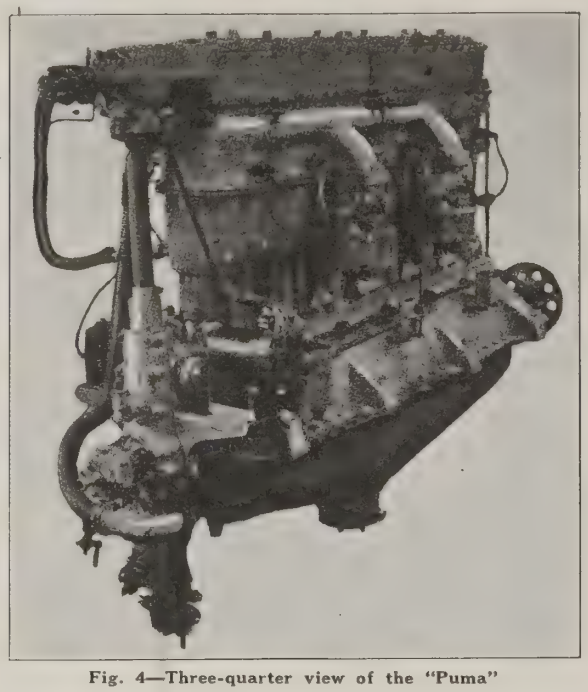


Fig. 4—Three-quarter view of the "Puma"

below the gudgeon-pin; the two grooves, whose sides are chamfered, are provided—one immediately below the lowest gas ring, and the other immediately below the scraper ring—in order to remove any surplus oil from the cylinder wall, this oil escaping into the crankcase through a row of small holes drilled in the bottoms of each of the two grooves. The hollow gudgeon-pin is made a floating fit in the piston bosses, longitudinal movement of the pin being prevented by means of "e"-shaped springs fitting into annular recesses cut in the piston bosses; the gudgeon-pin also floats in the little-end bush, which, in turn, floats in the connecting rod.

The connecting rods are machined all over from high-tensile steel, and are of H section. The big-end bearing cap registers into the rod and is held in position by four bolts; rotation of the white-metal lined bronze bush is prevented by a dowel pin.

The crankshaft is of the conventional six cylinder seven bearing type with the cranks spaced 120 degrees apart; both the crankpins and the journals are hollow, and in order to permit of internal circulation of oil the ends of both journals and pins are closed by two dished steel caps drawn together by a central bolt. The thrust bearing is situated some considerable distance from the foremost journal bearing, and for this reason a roller bearing is provided at the extreme forward end of the crankcase as an additional support for the shaft; beyond this roller bearing the shaft is serrated in order to receive the airscrew coupling. Screwed on to the rear end of the crankshaft is a single bevel pinion through which the camshaft and the whole of the engine accessories are driven.

The arrangement of the journal bearings is in accordance with the more usual six-cylinder practice. The upper halves of the intermediate bearings are carried in the upper half of the crankcase, the bearing caps being supported by long steel bolts, which also serve to hold the cylinders to the crank chamber. These bearing caps are of aluminium and are stiffened by steel keep-plates of channel section. The lower halves of the two end journal bearings are formed integral with the lower half of the crankcase. The whole of the crankcase is cast in aluminium, the upper half carrying the eight supporting arms of the engine, while the lower half serves merely as an oil sump. In addition to the four long cylinder bolts at the ends, the two halves of the crank chamber are held together by a large number of small bolts. The base of the lower half of the chamber inclines downwards from each end towards the centre and terminates in a small cylindrical well into which is fitted a filter for the oil; this filter is capable of being withdrawn from the outside of the engine.

The lubricating system of the engine is diagrammatically illustrated in Fig. 2. Driven by a vertical shaft, which operates the whole of the accessories, are two oil pumps of the gear type. The upper of these two pumps draws oil from an external tank and forces it through a filter carried on the off side of the engine and into a manifold of steel tube which runs through the whole length of the crankcase. Leading from this manifold are several branch pipes which supply oil to each of the journal bearings, the thrust housing, the bearings of the vertical shaft, the bevel wheels driving this shaft, and to the skew gearing operating the magnetos. The oil fed to the main crankshaft bearings passes into the hollow journals and by way of holes drilled in the crankwebs to the crankpins; oil is flung off the crank pins on to the cylinder walls and the little ends of the connecting-rods. Branching from the front end of the manifold is a pipe of constricted bore, through which oil is fed to the hollow camshaft. Some of this oil is thrown out through radial holes on to the camshaft bearings; after exuding from these bearings, it is flung on to the cams, rocking-levers and valve heads; the oil then collects in the bottom of the camshaft housing and is ultimately conveyed therefrom to the crankcase by way of two pipes. Such oil as is not thrown out continues to travel along through the camshaft, out of whose rear end it falls on to the upper pair of bevel wheels, and into the casting enclosing the vertical shaft, and eventually into the strainer in the base of the crank chamber. The oil which collects in the base of the chamber is drawn out by a second pump and forced back to the oil tank, from which it again circulates through the engine. As this second pump is of considerably larger capacity than the first, it follows that the sump is always free of liquid oil and excessive lubrication of the cylinders, due to oil splashed by the big-ends, is entirely prevented.

Two independent sparking plugs are fitted in each cylinder. Ignition may be carried out by two high-tension magnetos mounted upon platforms at the rear end of the engine and upon opposite sides of the vertical shaft from which they are driven by skew gearing. Usually one magneto is fitted, the second set of plugs being served by a small six-volt battery, through a Remy combined contact-breaker and distributor mounted at the rear end of the camshaft housing, and a coil carried on the other magneto platform.

The general layout of the engine is very well shown in the accompanying illustrations (Figs. 3 and 4). It will be

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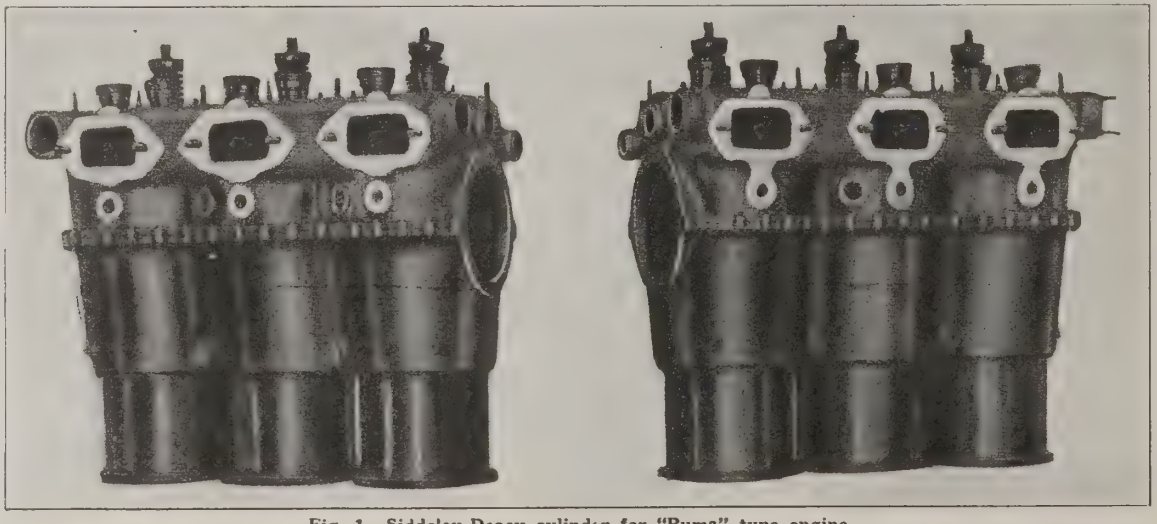


Fig. 1—Siddeley-Deasy cylinder for "Puma" type engine

THE BRITISH ENTRIES IN THE TRANS-ATLANTIC RACE

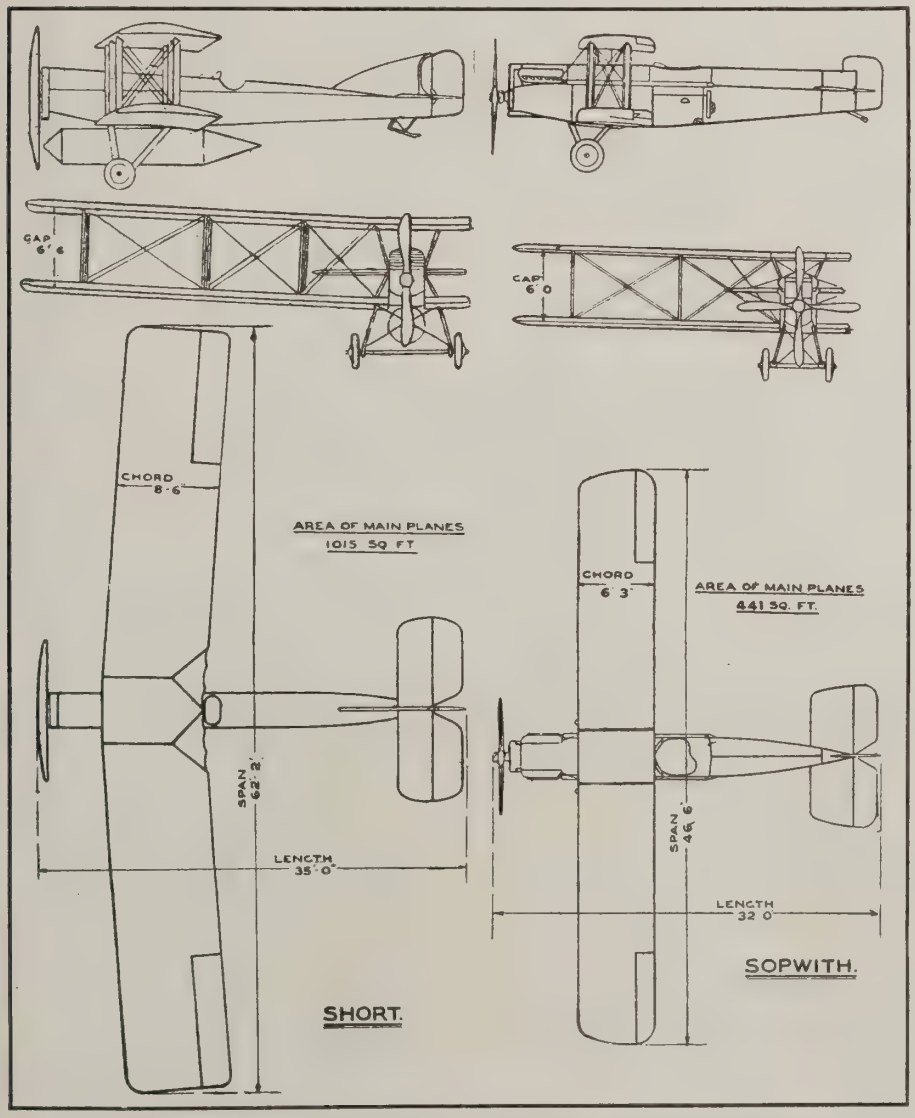
AS interest centres more and more in this race, a few words dealing with the British machines entered will, we feel sure, be welcomed by our readers. From "Flight" we are able to give details of the machines entered to date.

Machines	H.P.	Speed	Pilot
Martinsyde ..	285	100	Mr. F. Raynham
Fairey	375	120	Mr. S. Pickles
Short	350	95	Maj. J. C. P. Wood
Sopwith	350	100	Mr. H. G. Hawker
Whitehead ..	1600	115	Capt. A. Payzo
Seaplane	440	—	Capt. H. Sundstedt

The Sopwith Machine

The Rolls-Royce engined Sopwith transport type specially designed for an attempt to win the Daily Mail Prize for crossing the Atlantic, is of the vertical biplane type, the wings having no stagger. Pilot and navigator are seated well aft, so as to give a large space in the fuselage between them and the engine, in which to fit the large petrol tank required for the great amount of fuel that has to be carried for a flight of this duration. This tank has a capacity of 330 gallons, while the oil tank contains 24 gallons, and the water reservoir 17 gallons. The weight of the machine empty is 3,000 lbs., and fully loaded she weighs 6,150 lbs. The accompanying general arrangement drawings will give a good idea of the dimensions of the machine. The engine fitted is a Rolls-Royce "Eagle" of 375 h.p., which will give the machine a maximum speed of 118 m.p.h. This speed will not, of course, be maintained all the way, the most economical speed from the point of fuel consumption lying somewhere between the maximum and the minimum speed, and varying with the lightning in load as the fuel is consumed.

The cockpit of the occupants is arranged in a somewhat unusual way, the two seats being side by side, but somewhat staggered in relation to one another. The object of this seating arrangement is to enable them to communicate with one another more readily and to facilitate "changing watches" during the long journey. The very deep turtle back of the fuselage is made in part detachable, the portion which is strapped on being built so as to form a small lifeboat in case of a forced descent on the sea. In this manner it is hoped to provide sufficient flotation for the occupants to remain afloat until a passing vessel may pick them up, should a descent be necessary. As the machine is not fitted with floats, it would, of course, be out of the question to get her off again once she was in the water. In other respects the machine does not differ greatly from standard Sopwith practice.



Scale planes of the Short and Sopwith Trans-Atlantic Aeroplanes

The Short Machine

Fundamentally the Short machine entered for the race does not differ greatly from their standard torpedo carrier known as the "Shirl." It is, as will be seen from the general arrangement drawings, a land machine fitted with wheels. In the place between the chassis struts usually occupied by the torpedo in the standard "Shirl" is slung a large cylindrical fuel tank which, should the necessity arise, can be quickly emptied so as to form a float of sufficient buoyancy to keep the machine afloat for a considerable period. In order to be able to carry the extra weight of fuel necessary for the long journey larger wings have been fitted, having three pairs of struts on each side instead of the two pairs fitted on the standard machine. A feature which is unique for this machine is the sweepback of the planes, which is very pronounced. This should form a very good feature by which to identify the Short machine, although from the fact that up to the present she is the only machine entered on which the westward flight will be attempted, she can scarcely be confused with any of the other entrants.

As in the case of the Sopwith machine, the Short is fitted with a Rolls-Royce "Eagle," and the fuel capacity is sufficient for a flight of 3,200 miles; in still air, of course. As the distance across is a little under 2,000 miles, this leaves a fair margin for adverse weather conditions, the prevailing winds in this part of the Atlantic being westerly at this time of the year. It will, therefore, be seen that the decision to make the westward flight may not be so dangerous as many are apt to imagine, and certainly considerable time will be saved by avoiding the delay of shipping the machine across before a start can be made.

The cockpits are arranged in the usual fashion in this machine, i. e., in tandem. A directional wireless set will be fitted as well as all the navigation instruments of the usual type. The maximum speed is expected to be about 95 m.p.h., but flying at cruising speed, and allowing for head winds, the actual speed may be expected to be considerably lower.

The Martinsyde Machine

The machine entered by Messrs. Martinsyde, Ltd., is more or less of standard Martinsyde type, with the occupants placed very far aft to allow of mounting a large petrol tank in the middle of the fuselage, in the neighborhood of the centre of lift where the decrease in fuel weight as the fuel is used up will not alter the trim of the machine. Unfortunately we have not been able to obtain any illustrations of the Martinsyde machine, but in outward appearance it does not present any radical departures from the standard. It has the distinction of being the lowest powered machine in the race, the engine being a Rolls-Royce "Falcon" of 285 h.p. As the Martinsyde machines have always been known for their great efficiency, this is an advantage inasmuch as less fuel will

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THE PRINCIPLES OF AEROPLANE DESIGN

By CAPTAIN JAMES VERNON MARTIN

INTRODUCTION

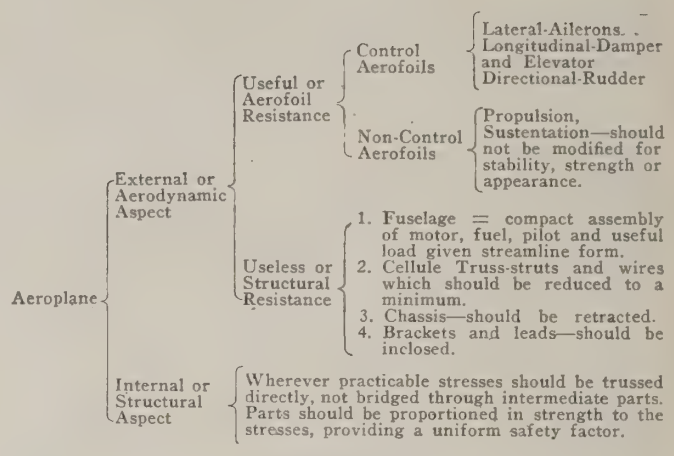
Primary Divisions

THE guiding principles of aeroplane design are neither numerous nor difficult of comprehension, but their thorough-going application involves the most painstaking laboratorial and flight tests and the replete use of higher mathematics.

Primarily the problem of the aeroplane is one of wind resistance, and secondarily of internal structure. This gives rise to the first division:—the external or aerodynamic, and the internal or structural aspect of the aeroplane.

It will be noted that the members of this division are relatively independent of each other; this means they form the basis for the study of special problems unconditioned by problems in the opposite division; for instance, the aerodynamic aspect deals with only the form and area of the parts of an aeroplane exposed to the air, while the structural problems, limited to the dimensions and stresses aerodynamically determined, may be pursued without further reference to air resistances. In other words, it is a matter of indifference aerodynamically what structure or safety factors are employed within the external skin for an aeroplane, and of equal indifference structurally what aerodynamic characteristics the aeroplane may have. As a consequence we find planes in which the structural engineer has trussed his stresses so ingeniously that a large percentage of the total weight is represented by useful load, but the total load carried will vary directly with the aerodynamic properties of the plane or, more specifically, with the lift/drift ratio and the horsepower employed; thus the plane may be very good structurally and poor aerodynamically, or vice versa.

I do not hesitate to emphasize the importance of rendering these primary divisions clear and distinct in order to avoid serious confusion, and in order to assist the student of aviation in electing to which sub-division he should devote his energies.



External Aspect

Of one thing I feel certain, that there will be found no other word so universally applicable to the successful achievements of the aeroplane engineer as the word "compromise," for my own experience teaches that while we have clearly defined ideals, we must always remain at a respectful distance from them because of practical inhibitions.

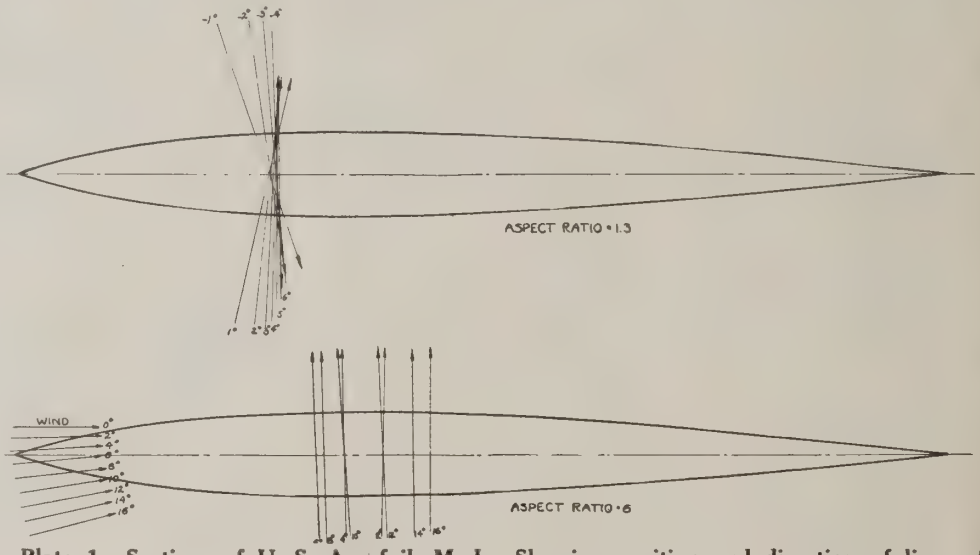


Plate 1—Sections of U. S. Aerofoil, M. I. Showing position and direction of lines of resultant air force

As a working example of this conflict between the aerodynamic ideal and the practically attainable, let us consider the recent attempts to design and build what may be termed the perfect aeroplane, one having only useful or aerofoil resistance. Such an aeroplane is obtained by selecting an aerofoil of comparatively deep cambre and increasing the cord until the resulting wing section is deep enough to completely house motor, man, fuel, chassis and useful load. Thus in the drawing, Plates 1 and 2, we have an aerofoil U. S. M. I. which with a standard aspect ratio compares most favorably in efficiency with other aerofoils, and is of nearly double cambre; it also has a relatively slight center of pressure movement throughout flying angles, and is particularly well adapted for the requirements of this problem in possessing zero lift at zero in-

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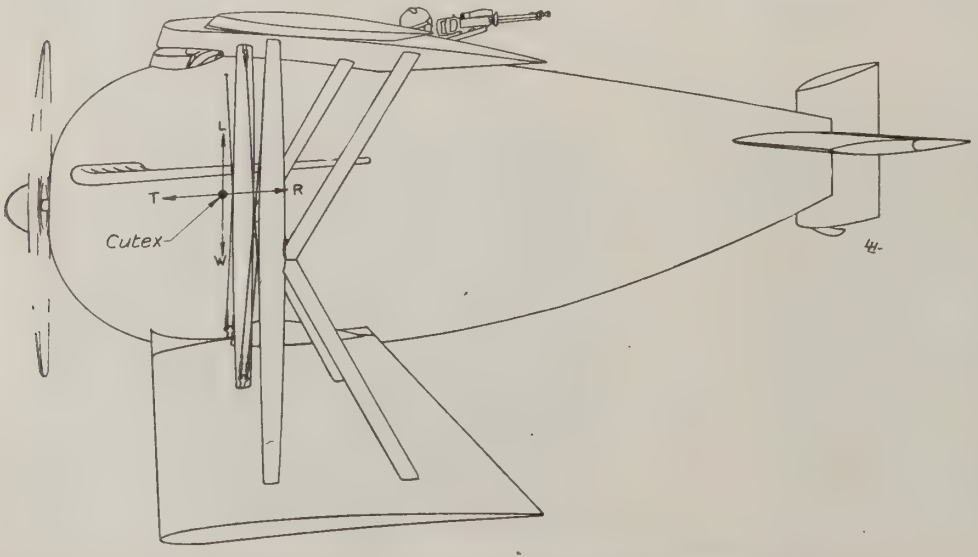


Plate 3—Perspective of Tractor Biplane indicating position of cutex

SECOND PAN-AMERICAN AERONAUTIC CONVENTION AND EXHIBITION

To Be Held Under the Auspices of The Aero Club of America, The Aerial League of America and the Pan-American Aeronautic Federation.

From Thursday, May 1st, 1919,
to
June 1st, inclusive,
at
Atlantic City, N. J.

Intercollegiate Contests Throughout the Summer

CONTESTS TO BE HELD EACH SATURDAY

(1) Seaplane Contests (general),
(2) Curtiss Marine Flying Trophy and Prizes,
(3) Intercollegiate Seaplane Contests,
(4) Land Aeroplane Contests,
(5) Dirigible Contests,
(6) Kite Balloon Speed in Ascending and Descending, and Maneuvering Contests,
(7) Parachute Competition,
(8) Aviette (bicycles and motorcycles with wings) Contests.

EVERY DAY ACTIVITIES

(1) Exhibits of Aeroplanes, Motors and Accessories on the Steel Pier,
(2) Demonstrations and tests of Seaplanes, Land Aeroplanes, Motors, Dirigibles, Kite Balloons, to prospective purchasers and representatives of different governments,
(3) Aerial Passenger Carrying by seaplanes and dirigibles, and kite balloon ascensions,
(4) Moving pictures and Addresses by leading authorities on most important phases of aeronautics.
(5) Competition for the Pulitzer Trophy.
(6) Competition for the Atlanta Journal Trophy.
(7) Competition for the Curtiss Marine Flying Trophy.

The Governments and Aeronautic, Sporting, Scientific, Industrial and Civic organizations of the United States and all the countries in the world, excepting Germany and her allies, are invited to send representatives to attend this great aeronautic event. On arrival in the United States these representatives should call at the Headquarters of the Convention Committee at No. 297 Madison Avenue, New York City, to register and receive their official badges and the official program.

In the event that it is more convenient for them to go directly to Atlantic City they will register at the offices of the Convention located at the following Atlantic City hotels: Hotel Traymore, Hotel Chalfonte, The Breakers Hotel, Hotel St. Charles, Hotel Marlborough-Blenheim, Hotel Chelsea, Hotel Alamac, Hotel Dennis and Hotel Haddon Hall.

Representatives of the Convention Committee will be at the Bureaus of the Aeronautic Convention at the above-named hotels and will issue the official badges which admit the bearer to the Aeronautic Hall, as well as the Aero Exhibition on the Steel Pier, the judges' enclosure during contests, and to the Aerodrome and seaplane stations where the aircraft and motors will be demonstrated.

All communications until May 1st should be addressed to Rear Admiral Peary, Chairman, Aeronautic Convention, Aero Club of America, 297 Madison Avenue, New York City.

Entries for the contests should be addressed to the Contest Committee, Hotel Chalfonte, Atlantic City, N. J.

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Atlantic City, N. J.

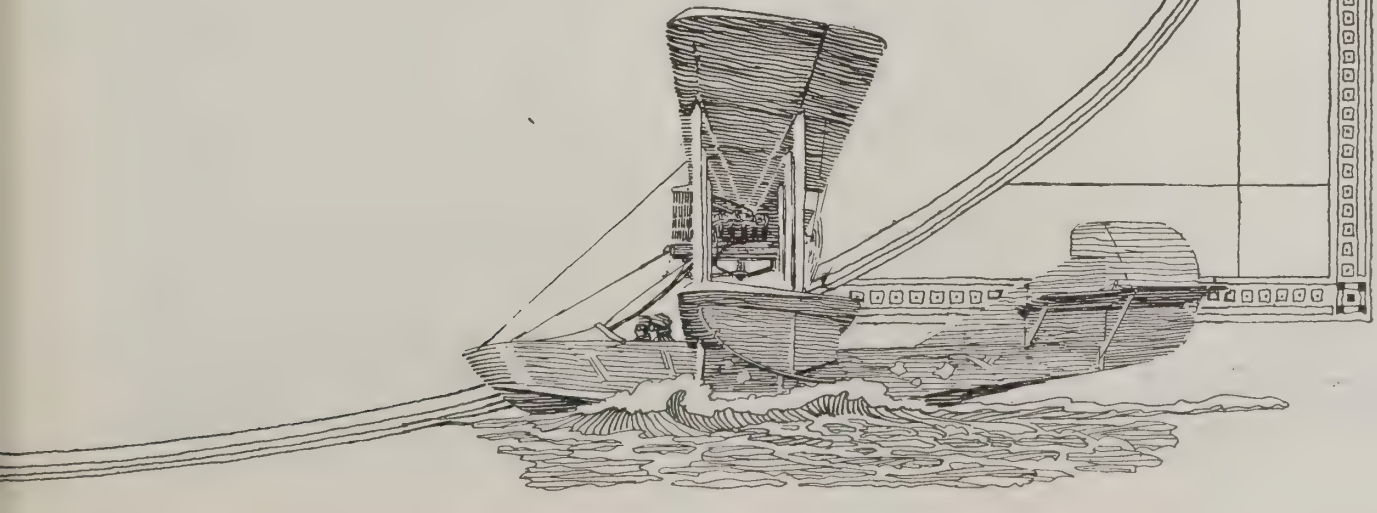
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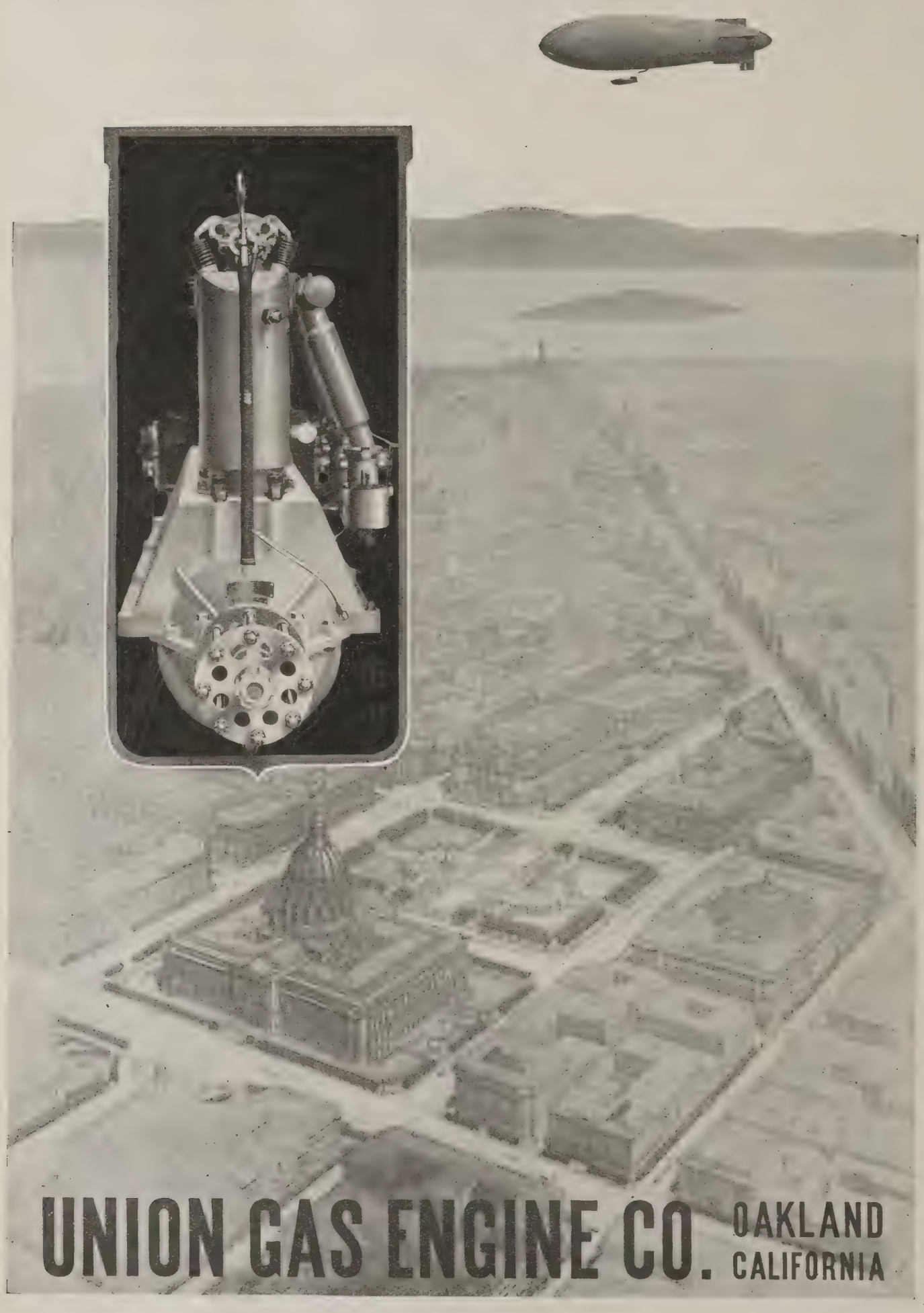
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cidence which avoids longitudinal stability problems due to enormous speed.

But having overcome all the special problems involved, and after having evolved an internally trussed wing of great strength, is the job when complete as efficient aerodynamically as the best job of the imperfect type? I answer, No, not at least up to the present writing, for the acid test of a final job, its total lift/drift ratio shows less value than certain standard tractor biplane types. The race for efficiency is very close and while the best conventional type has many practical advantages over the perfect or wing type, I shall certainly not be so dogmatic as to deny the future possibility of adapting the wing type successfully in these respects. It is a more fundamental compromise which leads me to hope for the continued supremacy of the tractor biplane, namely, the effect of aspect ratio and the plan form of an aerofoil upon the lift/drift ratio.

Our wind tunnel experiments show that a reduction in aspect ratio (that is, a reduction in the span of the wing relative to its cord) results in a decided loss in efficiency; for instance, tests made with the M. I. section having an aspect ratio of six shows lift/drift curves, (a) Plate 6, while the same section reduced in aspect ratio to 1.3 shows lift/drift, (b).

Referring to Plate 3, the drift (R) of an aeroplane represents the air resistance which must be overcome by horsepower expended in the thrust in order to develop the lift (L) which represents the total load which can be sustained at a given speed. Thus it will be observed how direct an index to an aeroplane's aerodynamic efficiency we have in the total lift/drift ratio, and it follows that of two aeroplanes having equal safety factors and proportion of useful to total load that one having the greater lift/drift, ratio will be the more efficient and practically useful.

One example of the effect of a difference in lift/drift ratio in aeroplanes otherwise similar will be found by comparing a tractor biplane having a lift/drift of eight with one of ten on a flight of 400 miles. Supposing the machine with lift/drift 8 has a total load capacity of 5,000 pounds for a given horsepower expenditure, and that this is divided into weight of aeroplane 2,000 pounds, fuel—2,000 pounds, and useful load—1,000 pounds, then the aeroplane having a lift/drift of 10 and the same horsepower and structural weight will have a total load of roughly 6,000 pounds, divided into weight of aeroplane 2,000 pounds, fuel 2,000 pounds and useful load 2,000 pounds. It will be evident that we do not fly the 400 miles in order to carry the aeroplane weight or the fuel consumed en route, hence, since the difference between the respective lift/drift ratios doubles the useful load, it will be observed that in this instance an increase of 20 per cent. in the lift/drift ratio has doubled the practical utility of the aeroplane. When considerations such as these are realized, it will not be long ere the commercial and military demands of an aeroplane will resolve themselves into two prime factors, one concerning the total lift/drift and the other the ratio of useful to total load.

Having digressed slightly to emphasize the value of the highest possible lift/drift ratio, let us return to the problem as to which type of aeroplane promises the highest ratio. The highest ratio obtainable, judging from data so far available, is from an aerofoil having an aspect ratio of ten and a form of wing end similar to that shown in Plate 4, and our problem is, what departures from this ideal will involve the least lift/drift reduction?

Suppose we attempt to obtain a good aspect ratio, say 6 (See Plate 4), then if we are to avoid external trussing, as by supposition of the perfect aeroplane we must, we will find the distribution of our loads necessary. This could be attained by disposing our motors chassis and man, as represented in the sketch. The dimensions of this craft would be at least 40 feet in cord and 240 feet in span in order to afford a vertical dimension of 4 feet within the aerofoil skin at the greatest cambre. The many practical difficulties of this design will be readily apparent, but we shall dwell only with those essential modifications which make manoeuvrable flight possible, i. e., the improvisions to create adequate directional and longitudinal moments. The lateral movements can easily be secured by wing and ailerons, and through a regulation of their differential in respect to variation in the head resistance these ailerons could be used to create the necessary directional moments, but there still remains the very necessary leverage about the transverse axis in order to create an adequate longitudinal moment. If this could be secured by a flexing of the rear portion, we should indeed have the perfect aeroplane, and a study of Plate 5, Figures 1, 2 and 3, showing the displacement of the force vectors on R.A.F. 6 will indicate such a possibility. However, nothing short of an actual test of this type will answer the question of practicability.

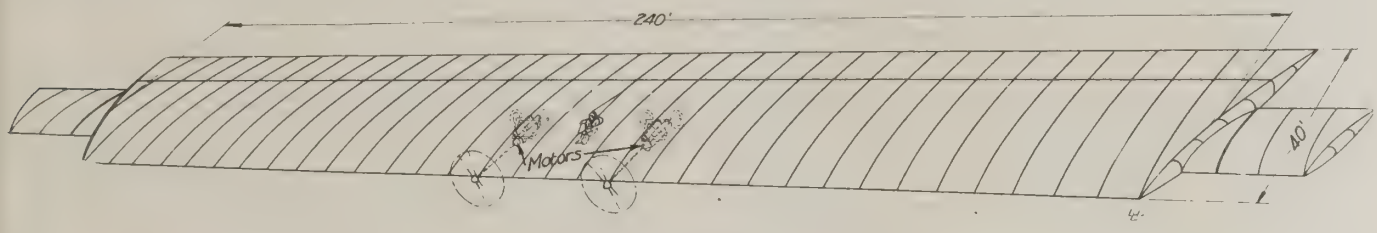


Plate 4—The perfect aeroplane

This study of the perfect type aeroplane leads us to compare the relative merits of the modified wing type Plate 2, having a low aspect ratio and the conventional tractor biplane. The issue is, whether the loss in lift/drift ratio, due to diminished aspect ratio, is greater than the loss due to the structural resistance of the tractor biplane as combined with an advantageous aspect ratio. There is an additional loss which seems necessary in the modified wing type aeroplane of low aspect ratio, namely, that requirement (Compare Plate 2 and Plate 4) which calls for the opposite form of wing end to that which has been found most efficient. When every care has been exercised to obtain the best ordinates for a deep cambre wing (here also there is a loss, probably 10 per cent. over less cambred section), we find both by calculation and by wind tunnel test that it is difficult to secure a lift/drift greater than 10 with an aspect ratio of 1.3. (See Plate 6).

The next consideration is: to what minimum can structural resistance in the conventional type be reduced in order to compete with the above figure. It may be interesting to note that the lift/drift ratio on the average Naval and Military plane, as at present constructed, varies from a low mark

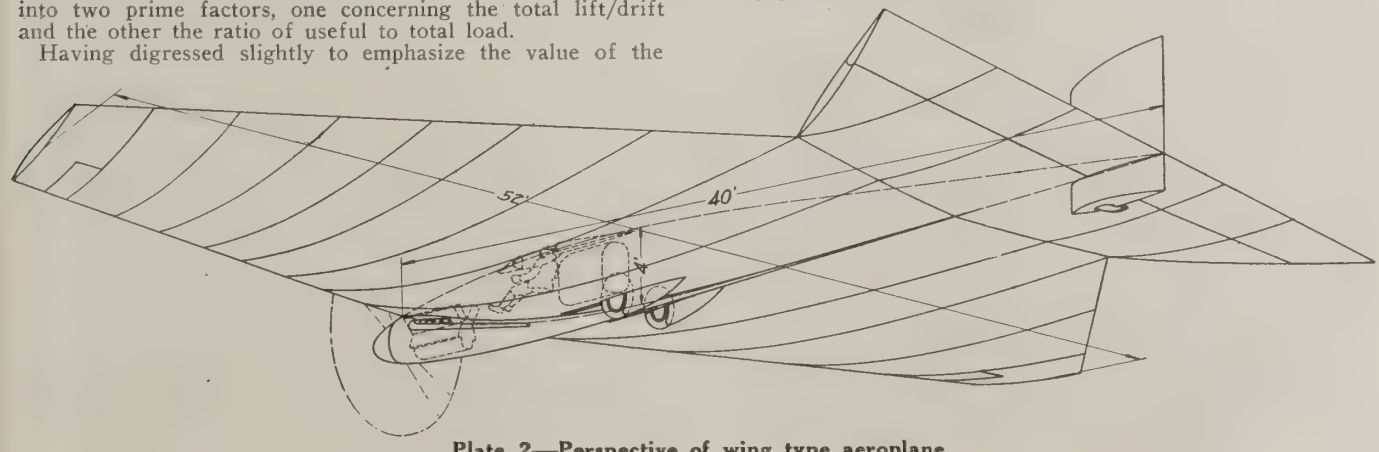


Plate 2—Perspective of wing type aeroplane

below 6 and seldom reaches more than 8, but this is due partly to a lack of appreciation of lift/drift ratio by Government Officials and partly to the influence of the war tending to retain for rapid production types truly antiquated in design. However, this may be, our study must be with the possible minimum to which the useless or structural branch of the aerodynamic aspect may be reduced. Reference to the divisional tree will show that this resistance may be grouped under four heads. Since by supposition we have no room within the wing for motor, pilot, useful load, etc., these should be grouped within the smallest space possible, disposed in a longitudinal relation to each other, and then surrounded by a streamline body. This represents the fuselage or body resistance, and cannot be further reduced as an element; in fact, double use is made of this body in utilizing it not only as the housing referred to, but as the lever arm for the empennage moments (Directional and Longitudinal).

We next meet the problem of providing a truss for the wings which will distribute the weight of the fuselage, centrally located, to the wings with a uniform safety factor; but we find the ratio of wing span to wing cambre so disproportionate that a wholly enclosed cantelever truss becomes impractical (I do not say impossible, for at great sacrifice of the useful load, and using a very thick wing, this could be done) and it remains to select the simplest form of external truss, i.e., one having the least projected area and trussing the stresses at natural concentrated points of advantage. Here again we meet the forks in the road, and must choose between the monoplane and aeroplane of superposed aerofoils. During the period from 1910 to 1913 it was the consensus of opinion among aeroplane constructors that the cellule truss, with its interference, must always remain at a disadvantage to the monoplane, but the advent of the early Bristol scouts showed that the tractor biplane could attain more speed than the simplest trussed monoplane of the same horse power and that at speeds of 100 m.p.h. and over, the comparative simplicity of the biplane trussing was more than enough to offset the losses due to plane interference. The reason for this will be more readily comprehended when we understand that a portion of the interference in the conventional double strut biplane is due not to affect of plane upon plane, but to affect of wires and struts upon both upper and lower plane and that the interference on the upper surface of a wing is roughly three times as detrimental as a proportionate disturbance on the lower surface. We find the monoplane has more projected area in a truss of comparative strength to the single lift truss biplane cellule and also has some interference.

Now, to what extent may the projected area and interference of the biplane cellule be reduced? A very simple computation will show that the conventional one-to-one gap-to-cord ratio is about the best obtainable with the double truss cellule commonly in use, the reason for this being that the increase of structural resistance and weight in struts and wires due to using greater gap than cord more than offsets the slight reduction of the interference due to separating the superposed wings; neither is there any total advantage in staggering the planes relative to each other.

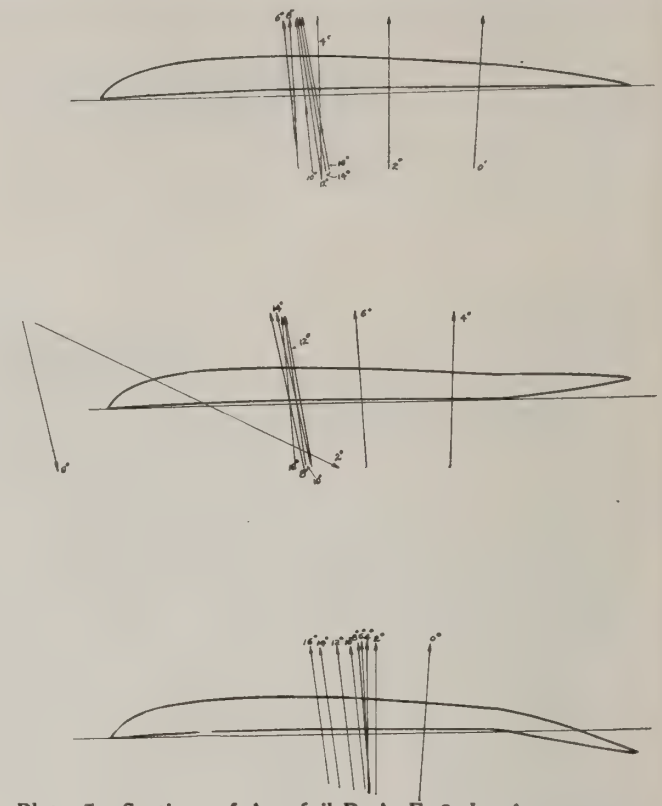


Plate 5—Sections of Aerofoil R. A. F. 6 showing movement of centre of pressure caused by flexing the trailing edge

Since the intercellule struts and wires constitute the undesirable structural resistance and also cause a considerable percentage of the interference, it follows that the most direct remedy will be to reduce these members in number, size and wind resistance. The last mentioned was the first means to be employed, namely, forming struts and wires so as to give them streamline form. The size of the members is more or less definitely determined by the stresses applied so that a reduction in the number of members seems the most hopeful means of securing the advantage we seek. This is accomplished by using a single instead of a double cellule truss.

An inspection of Plate 5, Fig. 1 will show the position of the center of pressure or life on a standard aerofoil for normal flying angles. Our problem is to truss this force directly and simply throughout its normal movement and to care for the displacements due to abnormal movements. It should be noted that if we can meet the above requirements we gain in four distinct ways:

1. A direct reduction of structural resistance due to elimination of parts.

2. A reduction in weight due to the concentration of stress in one rather than in several members,

3. A reduction of the interference due to partial elimination of struts and wires.

4. A reduction of interference due to increased gap/chord ratio which the single truss permits.

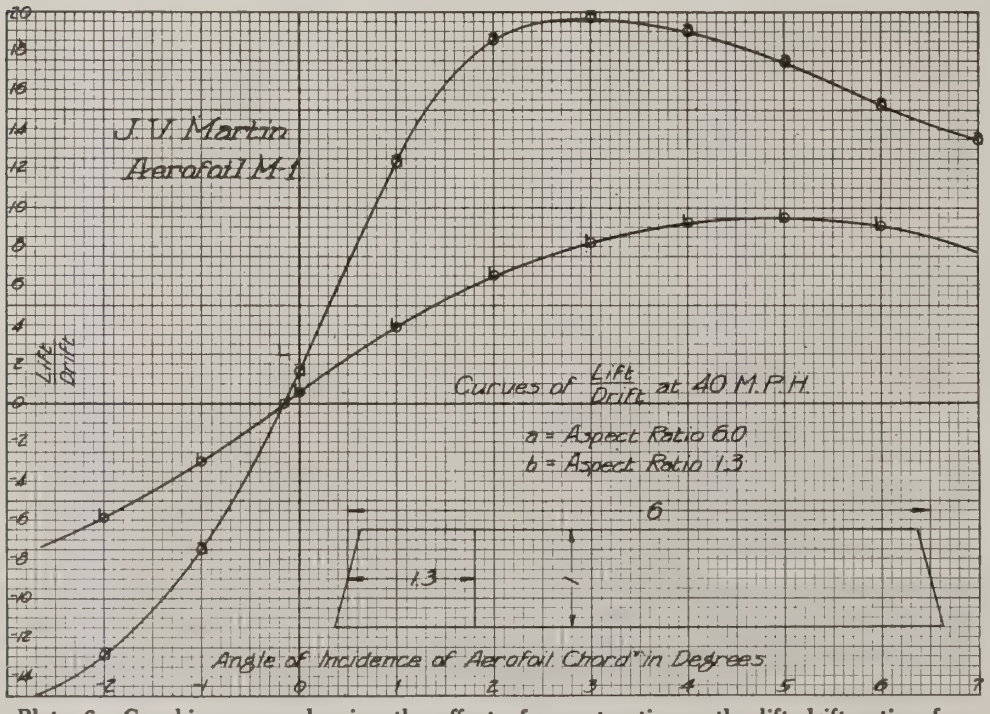


Plate 6—Graphic curves showing the effect of aspect ratio on the lift drift ratio of an aerofoil

(To be Concluded)

THE MANUFACTURE AND USE OF GLUES IN AEROPLANE CONSTRUCTION

By B. C. BOULTON, B. S., A. E.

PART II.

(*Continued from page* 396)

Mixing of Casein Glue: To obtain satisfactory results with casein glue it is of extreme importance that the glue be properly mixed and applied. The directions issued by the best manufacturers with each brand of glue can be relied upon, and should be carefully followed.

Thorough mixing before use of the contents of a freshly opened barrel of prepared glue is advisable in all cases, because in shipment the heavier ingredients of the glue tend to separate out. The contents of the barrel, or barrels, are emptied into a box of suitable size and turned over with a clean shovel until the mass is uniform throughout.

Rapid stirring during the first few minutes of mixing is necessary with casein glues to prevent the formation of lumps. For this reason the slow machines used for mixing animal glues are unsatisfactory. The best type is a vertical, compound movement power mixer of variable speed, similar to the cake mixers used by bakers. In such a machine the glue is mixed in a relatively small, detachable kettle that is easily removed and cleaned. The small size of the kettle makes it possible to mix up no more than will be used before the glue hardens so that it cannot be spread. Except for larger work, the glue should be furnished the men in one-pint, enameled iron cups. Copper, brass, or aluminum vessels should not be used for mixing casein glues, as the alkali in the glues attacks these metals. To prevent spattering of the glue outside the mixing kettle a metal hood, fitted with a feed hopper, will be found effective.

Since, with very slight modifications, the procedure used in mixing Certus glue can be adapted to other casein glues it will be given here. The requisite amounts of water and glue, which are in the proportion of 18 parts by weight of water to 10 parts of glue, are carefully weighed out in separate containers. Owing to slight variations in the dry glue, this proportion may have to be altered slightly to give a glue of uniform consistency. The water is poured in the mixing kettle; the machine speeded up to about 350-450 r.p.m. of the blade, which for most mixers corresponds to about 140 r.p.m. of the vertical shaft; and the glue gradually introduced through the hopper. It is of great importance to avoid the formation of lumps. The rapid stirring is contained 3-5 minutes after the last of the glue has been added. The mixer is then stopped to permit the scraping down of any glue that may have spattered on the sides of the kettle. When this has been done the machine is again set in motion, but at a slower speed (60-90 r.p.m. of the shaft) and the mixing kept up for at least ten minutes, or until all the fine particles of casein are dissolved. The purpose of the reduction in speed during this second mixing is to allow the escape of air bubbles that may have been whipped into the glue. Should there still be an appreciable amount of air in the glue it is advisable to permit the mixture to stand a short time before using, so that the air can separate. Some casein glues require the addition of various ingredients singly, and it is necessary to change the above practice to conform to the manufacturer's directions.

On important work it is best not to make any changes in the consistency of the glue. But if the mixer is familiar with the nature of the glue being used, it is permissible to alter its consistency before the glue has been removed from the mixing kettle. In case the glue is too thick, an extra part or two of water may be added, or if it is too thin a small amount of dry glue may be put in. Stirring at a slow speed should be kept up a few minutes until the water is thoroughly incorporated in the mixture, or the glue completely dissolved. With a glue in which the different constituents are added separately this method cannot be followed. It is possible, however, to mix up a thick glue and add this to the thin glue, but the practice is not good.

Application of Casein Glue: The results of tests show that, at any time during its working life, good results may be obtained from normal glue. In fact, the strength of the glue increases with its viscosity. But once it has become too thick to spread properly the remaining glue must be rejected. The working life of casein glue varies with different brands; Certus is one of the more satisfactory in this respect, as usually it is workable for 4-5 hours after mixing. Liberal application of the glue to all the surface of both faces of the joint gives the best results. Some glue should squeeze out of the joint when pressure is applied. The clamps should be put on as soon as possible, not more than 10 minutes after the spreading is begun, depending on the kind of wood, the amount of glue used, the temperature, and the glue consistency. About 150 lbs. per sq. in. is a suitable pressure; more than this tends to squeeze the joint dry of glue.

The minimum time the joints should be kept under pressure is about 3-5 hours, varying with the size of the glued surface. Upon removal from the clamps the wood should be dried to remove the moisture added by the glue, particularly if varnish is to be applied. Full strength and water-proofness are not attained until about two weeks after the gluing.

The most essential precautions may be briefly summarized: 1. Mix thoroughly each barrel of glue before using. 2. Weigh the glue and water; do not measure them. 3. Avoid lumpy mixtures. 4. Avoid mixtures which are too thick or too thin. 5. Mix until all the fine particles dissolve and a smooth mixture is obtained. 6. Do not attempt to use glue after it has become too thick to spread properly. 7. Never thin or thicken glue once it has left the mixer. 8. Keep all brushes, kettles, and pots sanitary to prevent bacterial infection of the glue.

Factors Affecting the Quality of Casein

The variation in caseins from different sources, or even in successive shipments from the same manufacturer, are often so great as to make necessary changes in standard glue formulae if satisafctory results are to be obtained. Regulation and standardization of the processes used in the production are essential if casein glue is to be made reliable in strength and water-proofing qualities.

The Forest Products Laboratory has recently completed extensive experimental work on this subject. It was found that, for the purpose of controlling the quality of the product, the following properties serve as suitable criteria: color, odor, fineness, and moisture, ash, nitrogen and acid content. Their conclusions may be summarized as follows:

1. Lack of uniformity in commercial casein is due, partly to lack of care in skimming the milk, drying the curd, and grinding the casein, but largely it is due to the different methods used in precipitating the curd and to insufficient washing of the curd.

2. The fat content should be as low as possible since, though it does not affect the waterproofness of the glue, it decreases its strength in proportion to the amount of fat present.

3. The acidity should also be kept low because acid affects unfavorably both the strength and waterproofness of a glue, increases the time required to dissolve the glue, and decreases its working life.

4. The fact that ash (mineral salts) is inert matter makes it undesirable.

5. Casein which will not pass a 60-mesh sieve does not dissolve readily, must be allowed to stand considerably longer before using than finer casein, and is not of such high strength.

6. To produce casein of low acidity, low ash and high nitrogen contents the curd must be thoroughly washed; with the natural sour method 3 or 4 washings are enough, with an acid curd cooking is the only safe way.

7. The sole method at present of producing a consistent, low ash content is the so-called ejector process. Further study of acid methods will probably develop means for better removal of the ash.

8. With care in the manufacture, and proper control of the product by chemical analysis, a uniform, commercial casein can be readily produced at the present time that will conform to these specifications:

Color, white; ash content, 2.5 per cent (max.) on a moisture free basis.

Odor, sweet; fat content 1.5 per cent (max.) on a moisture free basis.

Fineness, 60 mesh; nitrogen content, 14.5 per cent. (min.) on a moisture, fat, and ash, free basis.

Moisture, 8 per cent (max); acidity content, 2.5 cc. N/10 alkali per gram (max.) on a moisture free basis.

Testing of Glue

Two general types of tests have been developed, each type designed to serve a different purpose. The first is primarily

for the glue or aeroplane manufacturer who must have simple, inexpensive, and rapid means of checking up, from day to day, the relative quality and uniformity of his product. The second is essentially for a well-equipped, experimental laboratory for the purpose of determining, by more or less elaborate and extended quantitative tests, the suitability of certain glues for specific uses, or of developing and improving new glues. Viscosity, jelly, odor, foam and litmus tests fall under the first head; shear strength and the various deterioration tests come under the second. In doing all testing work it is extremely important that average working conditions be closely followed in the preparation of the test specimens, for otherwise, no indication is obtained as to the actual commercial product. If comparative results are to be obtained it is necessary, in each test, not only to have the strength of the glue solution the same, but also the conditions of temperature and humidity. In the preparation of specimens for shear strength tests care should be taken to use wood of uniform quality, and to have the surfacing of the joint, the spreading of the glue, and the pressure as nearly uniform as possible.

Animal Glues: Since these glues, even when treated with formaldehyde or potassium bichromate to render them insoluble, are only partially water-resistant and therefore must always be protected, severe deterioration tests are seldom made on them. Most of the testing is on those properties which are indexes of the strength, covering power, and keeping qualities of the glue. The determniation of the moisture content is of value in indicating the elasticity of a glue, or its power to stretch slightly without fracture. A dry glue is low in elasticity, and, though it may be very strong under steady stress, it fractures readily upon sudden application of even a small load. The moisture content varies between 5 and 18 per cent, but with a good glue it is not less than 10 per cent. The "water-absorption power" of a glue, or the amount of water a given amount of dry glue will absorb in 24 hours, is to a certain extent a measure of its quality. Generally speaking, the lower the absorption, the better is the glue. Another property that is usually indicative of the character of glue is the viscosity of a solution of specified proportions of water and glue. As a rule, glues of high viscosity are of high quality and strength; hide glue, for example, which is more viscous than bone glue, is superior to it. Another common test used to check up the quality of a glue is the determination of the consistency or strength of a jelly prepared in a specified manner. Strong glues usually have high jelly strength, though this is not invariable. The ease with which a glue may be spread, or its covering power, is another property of much interest. This may be estimated from the water-absorption, viscosity, and jelly strength. The covering power is high when the water-absorption is low, and the viscosity and jelly strength high. The keeping quality of a glue is one more important characteristic. Decomposition is due to bacterial action, and a slight acidity of the glue, which is unfavorable to the growth of bacteria, is desirable. Whether a glue is acid or alkaline, is determined by testing a solution with litmus paper.

The tests mentioned above are of a qualitative nature, and serve only as general guides. Below are given briefly the methods used in making the tests required by specifications for glue used on government work.

Tests for Hide Glue:

1. The viscosity is determined by allowing 200 cc. of glue at a temperature of 140° F. to flow through an orifice. The time required for water to flow through is taken as the standard. The approved instrument for this test is the Engler viscosimeter.

2. The jelly strength is determined upon a mixture of 12 parts water to 1 part glue. The glue is soaked, melted, and poured at once into a vessel of standard shape and size. It is then allowed to stand at least 15 hours in a refrigerator at a temperature between 40° and 50° F. The test is made, either by comparing the relative strengths of two or more jellies by pressing the jelly with the fingers, or by causing a small plunger to sink down in the jelly a certain distance, and noting the weight required to do this.

3. The test for grease is made by mixing a dye with a portion of the glue and painting the mixture on a piece of unsized white paper. Should the glue contain no grease the painted streak will have a uniform appearance, otherwise it will appear mottled or spotted. An excessive amount of grease is undesirable because grease has no adhesive qualities, but a small amount helps to prevent foaming, particularly where the glue is to be used in a gluing machine in which it is agitated much more than when applied by hand.

4. The test for foam shall be made on the sample used in the viscosimeter. The sample, after being heated to 140° F. shall be beaten for one minute with a power egg-beater and allowed to stand one minute before the height of the foam is measured. Glue that foams badly is objectionable because air bubbles are liable to get into the joint and reduce the area in which the glue is in contact with both the joint faces.

5. The odor of the glue when in hot solution must be sweet, and remain sweet for 48 hours; that is, free from any suggestion of decomposing animal matter.

6. The adhesiveness of a glue is determined by a shear strength test made according to the following specifications. The specimens used in this test shall be of maple with a shearing strength of at least 2400#/sq. inch, which requires a wood weighing 50 lbs. or more to the cubic foot. The dry glue shall be mixed with that proportion of water which gives the strongest glue, and applied to the wood in a manner in accord with the best practice. The glued blocks shall be put under a pressure of about 150#/sq. in. for 15-20 hours, and when this is removed they shall be allowed to stand for 6 days more before testing. The specimens shall be finished to conform to the dimensions shown in fig. 1. They shall be tested to destruction in a standard testing machine. This specification covers shear tests for animal, albumen, and casein glues.

With the exception of the last, the above tests are not used for waterproof glues.

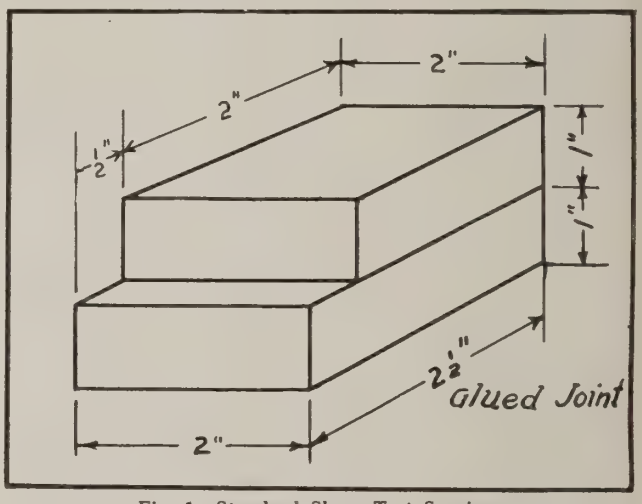


Fig. 1—Standard Shear Test Specimen

Deterioration Tests: Beside the shear test just described, waterproof glues are subjected to the water test. Specimens, prepared exactly as for the dry shear test, and with no protective coating whatever, are soaked for 15 hours in water at 70° F. They are then tested in shear, without any preliminary drying, within thirty minutes after their removal from the water.

For waterproof plywood panels further deterioration tests are required. 1. The boiling test; two specimens are boiled in water for 24 hours. The plies should show no signs of separation at the end of this time. This is an accelerated soaking test and has largely superseded the latter. 2. The baking test: two specimens are baked in an oven at 212° F. for 24 hours. The baking test may be made separately, though it is common practice to subject specimens, first to the boiling test and then to the baking test. No separation of the corners or plies should occur in this test. 3. The soaking test: two specimens are soaked two weeks in cold water and their condition noted from time to time.

It may be said in general that panels made up with animal glues, when unprotected with varnish, will never stand the soaking, boiling, or baking tests without serious injury, and

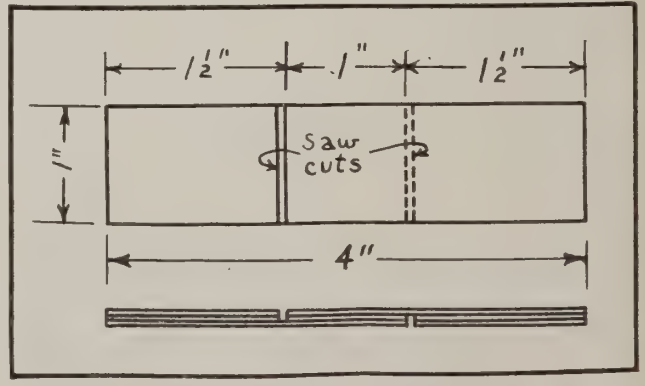


Fig. 2—Standard specimen for Plywood Shear Test

for the most part without complete failure. On the other hand, the best grades of both casein and albumen glues show very little or no deterioration under any of these, or other deterioration tests.

Strength Test Data: In the standard shear test with maple blocks, individual specimens will give maximum glue strengths of 2600-3000#/sq. in., with minimum values of 1800-2200#/sq. in. for hide, casein, and albumen glues.

The strength of glue as determined by shear tests on 3-ply veneer specimens is very low by contrast. It ranges from about 150#/sq. in., to 400#/sq. in. under favorable conditions. Test specimens are made up according to the dimensions shown in Fig. 2. They may be tested in an ordinary, cement briquette testing machine, but special means of gripping the specimen must be provided so that the pull will be kept parallel to the direction of the joint. If this is not done the plywood tends to bend, because of the eccentricity of the loading, until the pulls are in line, and failure occurs from a combination of shear and cleavage. This effect is more pronounced as the thickness of the plies, and hence the eccentricity of the pulls increases.

Bureau of Aircraft Production Specifications for Glues

No attempt will be made to give complete, detailed specifications; only the more important requirements will be mentioned.

Hide Glue Certified for Use in Aeroplane Construction: 1. The glue must be a high-grade glue, sweet and free from any deleterious substances. 2. The glue shall be tested, in accordance with the methods previously outlined, by comparison with a standard sample furnished by the Forest Products Laboratory, for adhesiveness, viscosity, jelly-strength, grease, foam and odor. 3. The glue used in the adhesiveness test should be mixed with water in four proportions, by weight:

Water	2	2¼	2½	2¾
Glue	1	1	1	1

4. That proportion of water which gives the greatest glue strength shall be used. For this best proportion no specimen may fail at a load less than 2200#/sq. in., and the average shearing strength must be 2400#/sq. in.

Handling and Testing of Hide Glue: This specification covers the methods and precautions to be used in the proportioning, soaking, melting and applying of hide glue. These have been given in detail in the section treating of hide glue. A shear-strength test must be made to ascertain the quality of the glue and the character of the work being done. For test specimens, 1-inch boards, of the same class of material as used in the work on hand, shall be glued up under the same average conditions as those under which the regular work is conducted; no special precautions may be taken; these boards shall be clamped and dried, as for the usual shear test. Ten specimens, conforming to Fig. 1, shall then be cut out and tested immediately. In at least eight specimens the strength of the glue shall not be less than that of the wood.

Casein for Casein Aeroplane Glue: 1. The casein shall be made from straight skimmed milk of low fat content and free from starch, dirt and other foreign material of adulterants. 2. The casein shall be precipitated by lactic acid, sulphuric acid, or hydrochloric acid methods. 3. The precipitating temperature should be about 120° F., never more than 130° F. Only sufficient acid to secure a clear separation shall be used. The curd shall be well pressed, and dried without delay to prevent moulding. Casein made from mouldy curd will not be accepted. 4. With the sulphuric acid process of precipitation, the cooked curd method is preferred. The temperature of cooking shall be about 190°-195° F. 5. All vats, cloths, and other apparatus employed in obtaining the curd must be washed each day the equipment is used. 6. The specifications as to the properties of casein and the proportions of some of its constituents follow closely the specifications suggested by the F. P. L. in the section, "Factors Affecting the Quality of Casein," though allowing in some instances slightly more leeway.

Casein Glue for Airplane Construction: 1. The certified glue shall be in the form of a powder not coarser than 50 mesh. 2. It must consist principally of certified casein. 3. The manufacturer shall prepare definite instructions for mixing the glue, and when these have been approved they must be exactly followed. 4. The test for adhesiveness shall be made on four standard shear specimens, prepared and tested in the specified, regular manner. 5. The average shear strength must be 2200#/sq. in. and the minimum in any single case 1800#/sq. in. 6. In a similar manner four more tests specimens shall be made up and subjected to the "water test" previously described. 7. The average shear strength must be 1500#/sq. in., and the minimum 1400#/sq. in. 8. The casein, after certification, must be properly stored in a dry sheltered place, such as is required for the storage of all glue and casein.

Application of Certified Casein Joint Glue: The specifications regarding the mixing and application of this glue and the precautions to be observed, are embodied in the sections describing these processes for casein glue.

Relative Merits of Different Glues

Of the animal glues, only hide glue is suited to aeroplane work. This glue possesses the advantage of being inexpensive, familiar to most work-men, comparatively easy to apply, reliable if careful supervision is exercised, and of high strength. It has the great disadvantage, in many classes of work, of being difficult to protect from moisture, and of being very seriously affected if exposed to moisture. Blood albumen glue is more in the nature of a special glue. Its chief disadvantage is that skilled workmen and elaborate machinery are required in its use. Unless conditions are very nearly right, its strength is apt to be uncertain. This glue shares with hide glue the disadvantages that are associated with hot glues; for the best results, the gluing should be done in an uncomfortably warm room, care must be taken to warm the wood and to prevent sudden chilling of the glue; because of the quick setting qualities of such glues, haste is necessary in spreading the glue and in applying pressure to the joint. On the other hand, blood-albumen glue is strong and very resistant to deteriorating conditions. For certain classes of work, as the manufacture of plywood, it is eminently satisfactory. More important than this glue is casein, because of its strength, reliability with proper care in its mixing and application, waterproofing qualities, ease of manipulation, and general adaptability to all classes of work. Some brands, however, give trouble by too rapid setting, and usually most casein glues must be mixed fresh every three or four hours. The development of this glue has been the most important accomplishment of all the research work on the subject of glues during the past year. Eventually, casein will probably largely replace other glues for general aeroplane construction, and even for propeller work.

(The writer wishes to acknowledge the value, in the preparation of this article, of certain reports issued by the Forest Products Laboratory and used with the permission of the Government.)

(*Continued from page 442*)

noticed that at the rear end is a small air pump, operated by an eccentric on the vertical shaft, for maintaining pressure in the petrol tank in such machines as rely upon air pressure for the service of petrol to the Zenith carburetors. On the same casing, and just below the air pump, is fitted the interrupter gear for a machine-gun. The centrifugal water pump is mounted immediately over the oil pumps and is concentric with reference to the vertical shaft.

Although not a standard fitting, arrangements are provided for fitting a rotary distributor upon the forward end of the camshaft housing, for use with a compressed air starting installation. For the same purpose small non-return valves are fitted in each cylinder, these valves being of the mushroom type and normally held in a closed position by means of light springs.

A few interesting figures concerning the Siddeley Puma engine are as follows:

Output at 1,500 r.p.m.	260 B.H.P
Output at 1,700 r.p.m.	290 B.H.P.
Petrol consumption	0·575 pts. per B.H.P. per hour
Oil consumption	0·040 pts. per B.H.P. per hour
Weight—dry	630 lbs.
Compression ratio	5·4/1.

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Olcott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in the order named.

Note 2—Report to Camp Pike, Arkansas.

Note 3—Report to Fort Logan, Colorado.

Note 4—Report to Director of Air Service.

Note 5—Report to Walter Reed General Hospital, Takoma Park, D. C.

Note 6—Report to 1550 Woodward Avenue, Detroit, Mich.

Note 7—Report to Director of Purchase, Storage and Traffic, Washington, D. C.

Note 8—Report to General Hospital No. 21, Denver, Colorado.

Note 9—Report to Pope Field, Camp Bragg, Fayetteville, N. C.

Note 10—Report to General Hospital No. 2, Fort McHenry, Md.

Note 11—Report to Speedway, Indianapolis, Indiana.

Note 12—Report to Middletown, Pa.

Special Orders Nos. 96 to 101, Inclusive

A
Andrew, Flynn L.....Note 3
Allison, Wallace M.....Note 2
Appleberry, Dailey .....HHN
Alexander, Wriston Charles.....Note 2

B
Brooks, Arthur Raymond.....CAP
Bell, George E.....FRF
Brown, Samuel E.....HHN
Barry, Louis T.....Note 8

C
Cowan, Royal Wesley Burnett.....FLA

D
Dezendorf, Edward Hamilton.....Note 2
Dennen, Frank Eugene.....Note 2

F
French, Samuel B.....RSD

G
Goodale, Frank W.....Note 2
Geehan, James Aloysius.....CAP
Grosse, Carl .....CAP
Gustafson, Charles L.....CAP
Gibson, Norman W.....Note 9
Gruner, Emmett .....FLA

H
Harris, Andrew Ross.....Note 2
Harrell, Raymond Harvey.....Note 2
Harris, Harvey E.....Note 7
Hayward, Lawrence A.....Note 8

J
Johnson, Arthur Lowell.....MDO

K
Kennedy, David Shelton.....FLA

M
Miller, Charles L.....FRF
McBride, James Thomas.....RWT
Meadows, James H.....Note 6

P
Peek, Norman W.....EOT
Potts, Clinton O.....CWT

R
Rudolph, Jacob H.....SMM
Ramey, George E.....Note 4
Rhinehardt, Claud K.....Note 10

S
Swaab, Jacques M.....CAP
Stenset, Martinus .....CAP
Seawell, John L.....Note 5

W
Weber, Harry .....Note 2

Officers Rated as Observers

The following-named officers, having completed the required course, are hereby rated as Observers: First Lieuts. Sidney P. Le Boutillier, James P. Carberry; Second Lieuts. Glennen K. Vars, Benedict Fox, Jerry L. Bennett.

Air Service Officers Discharged

Washington, D. C.—The following officers are honorably discharged from the service of the United States: Majors Harold R. Eyrich, Robert Marsh, Jr.; Captains Paul B. King, Edwin J. Fredell, Edwin F. Kingsbury; First Lieuts. Alvin C. Goetz, Charles R. Jacobus; Second Lieuts. Charlie D. Coleman, Thomas J. Naughton, Irwin Wheeler, Wilson S. Zimmerman.

Colonel Woods in Charge of Division of Information

Col. Arthur Woods, formerly Police Commissioner of New York City, has been placed in charge of the Division of Information, a bureau for the sole benefit of those men who have been discharged from the military service and wish to be directed to information concerning their bonuses, War Risk Insurance, civil rights, vocational training, and in general just what the Government is doing to help them re-establish themselves in civil life.

Ruggles Orientation Demonstrated to General Menoher

Washington, D. C.—The operations of the Ruggles Orientator used by the Army Air Service for instructing fliers was demonstrated on April 16th, at the Air Service building. Major-General Charles T. Menoher, Brig.-General Wm. Mitchell, Colonel M. F. Davis, Colonel T. de W. Milling, Colonel George H. Crabtree and other officers of the Air Service were present. The machine was demonstrated by Mr. W. G. Ruggles, the inventor, and Major F. J. Martell, General Mitchell and Col. Davis also had rides.

Personnel Board For Air Service Appointed

Washington, D. C.—A Board of Officers to consist of the following personnel has been appointed to consider such matters affecting the personnel of the Air Service as may be brought before it: Colonel Thomas de W. Milling, Military Aviator, Air Service Aeronautics; Lieutenant-Colonel Rush B. Lincoln, Air Service Aeronautics; Lieutenant-Colonel Daniel M. Cheston, Junior, Air Service Aeronautics; Major Horace M. Hickam, Junior Military Aviator, Air Service Aeronautics; First Lieutenant James A. Healy, Air Service Aeronautics, Recorded.

Army Aviators Pass R. M. A. Test

Washington.—The following-named officers, having completed the required tests are rated as Reserve Military Aviators:

Major Louis B. Knight.

Captains William S. Reyburn, Daniel Buckley, William M. Marrs, Walter R. Lawson, Albert C. Lord, Charles H. Schumacher.

Souther Field Notes

A committee of four prominent Thomasville, Ga., citizens motored to Souther Field recently for the purpose of securing a flight to that town on April 26th. They took back with them Lieutenant John MacRae, through the courtesy of Major Schofield, to advise on the proper selection of a landing field. The visitors were Mr. E. R. Jerger, Editor *Times-Enterprise*, F. B. Harris, R. G. Mays and J. C. Vaughn. Thomasville's enterprise is admirable.

On April 19th, the third Souther Field Victory Loan squadron left for Atlanta

to cooperate with the flying circus there and distribute literature en route. Four Souther Field Victory Loan squadrons left Souther Field this week to cover Georgia and surrounding states.

Airships More Efficient for Patrol Duty Than Aeroplanes in British Anti-Sub Service

Washington, D. C.—The following figures on the British anti-submarine patrol were recently given out by the War Department:

	Airships	Planes	Ratio in Favor of Airships
June-Dec., 1917			
Patrols per craft....	42	18	2-1
Hours flying per craft	228	36	6-1
Miles flying per craft	6452	2201	3-1
Escorts flying per craft	6	1.6	4-1
Jan.-April			
Patrols per craft....	37	17	2-1
Hours flying per craft	241	34	7-1
Miles flying per craft	6316	2081	3-1
Escorts flying.....	9	1.3	7-1
Men per hour flight..	2.3	4.7	2-1
Hours flight per man..	.65	.24	2½-1
Miles per man.....	52	47	—

Surplus Property Board Appointed

A Board of Officers to consist of the following personnel is appointed to determine the amount of surplus property of every kind in the Air Service: Major Harry Graham, J. M. A.; Captain Ralph J. Moore, Captain Louis B. Montfort, Captain Frazer Hale.

Construction and Electrical Engineer A. W. Duff will proceed from Washington, D. C., to Langley Field, Hampton, Va., reporting upon arrival to the Commanding Officer for temporary duty in connection with photography of bomb sights and bomb trajectories.

Second Lieutenant Walter L. Perley, Air Service Production, will proceed from Washington, D. C., to Chicago, Ill., thence to Toledo, Ohio; thence to Swissdale, Pennsylvania; thence to New York City, New York, on temporary duty in connection with the Air Service of the Army, for the purpose of obtaining the history of Lawrence OX-5, Gnome and Le Rhone aviation engines from the manufacturers.

Spherograph to Aid Training

Under direction of Professor Henry Lane Eno, of Princeton College, and Mr. O. V. Fry, of the Psychological Department of Princeton University, has designed and developed a device known as a spherograph in the operation of which on the ground a person experiences all the movements of an aviator in flying. In fact, with his eyes closed it would be impossible to detect whether he was in the air or on the ground. This remarkable device is intended for the training of aviators, with special stress laid on aerial gunnery.

It is so arranged as to develop the actual movements of a plane in the air with the exceptions of the movement of translation. By means of controls, similar to controls of a plane, the prospective combat-flyer aims his gun by moving his entire machine. When a target or objective is presented to him by the man in charge of the test, he pulls his trigger and a recording apparatus records the location of the moving trigger, the way the flyer manipulated his machine and the exact location of his sights at the moment his trigger was pulled. This enables the officer in charge to determine just what defects in marksmanship are shown and just what the flyer will have to do to remedy those defects. Insomuch as it is possible to tell the location of the machine at any given moment, as well as the rate of speed of either of the planes, the apparatus lends itself to very careful tests and the activities that go to make up the mental and physical work of an aviator.

The Long Island Aviation Flying School

Pilot-Instructor Bruce Eytinge, of the Long Island Aviation Company has drawn up an interesting form upon which detailed progress records are kept of his pupils at the Central Flying Field.

The record sheet is provided with space for recording the dates of each step in the instructing beginning with "lesson 1" "ground lecture" to "lesson 19"—"certificate flight," in successive steps as follows: Ground Lecture; First Initiation; Demonstration of Controls; Flying Straight and Level; Proper Climbing Angle; Proper Gliding Angles; Gentle Turns; Misuse of Controls; Gliding Turns; Side Slipping; Approach and "S" turns; Take-off and Landings; Getting out of Difficulties; Cross Country and Forced Landings; Final Landings; First Solo; More Dual if Necessary; Second Solo; Certificate Flight.

In advance instruction, "lessons 20 to 29" following manoeuvres are included: *Advance Instruction;* Forced Landing-Solo; Spinning Nose Dive; Stalling and Tail Slide; Steep Turns and Vertical Banks; Immelman Turns; Looping; Falling Leaf; Half Roll; Roll.

Favorable weather continues to bring out many visitors to the school, where the machines are always in readiness for flight. On Saturday, May 3rd, a short flight was made with Mr. George F. McLaughlin, Technical Editor of AERIAL AGE. By means of the Meissner Intephone system conversation was carried on between Pilot Eytinge and his passenger and intimate demonstration of the facility with which instruction is given the pupils. A continued stiff wind did not in any way prevent the perfect handling of the machine. Mr. Eytinge is especially familiar with the training plane, a Canadian Curtiss, having recently been in the Royal Flying Corps.

Cadets' Pay

Under a recent decision of the Comptroller of the Treasury, the Director of Finance has been authorized to make payment of all arrears in cadets' pay while in training for commission, in accordance with the following:

Cadets in the air service in training for commission should have been paid $100 per month as follows: Those at flying schools from July 13, 1917, to include June 30, 1918; those at ground schools from August 21, 1917, to include June 30, 1918.

After July 1, 1918, their pay was reduced to $33 per month at both flying and ground schools. Cadets serving at flying fields, if placed on flight duty by special orders of the commanding officer of the field at which serving, are entitled to 50 per cent. increase on $33 per month, for the period covered by such orders.

Cadets serving overseas in the American Expeditionary Force who received $100 per month are not entitled to increase for foreign service.

All cadets who have a just claim for arrears in pay while serving as cadet in training for commission will write to the Director of Finance, Discharged Enlisted Men's Pay Branch, Room 3303, Munitions Building, Washington, D. C., requesting that they be furnished with the necessary blank forms to enable them to properly file claim for back pay which is due them.

Dorothy Dalton Flies for Victory Loan

Dorothy Dalton, whose dimples and smile have charmed millions in Thomas H. Ince productions for Paramount pictures, achieved the distinction of being the first lady passenger to travel by hydro-aeroplane from Keyport, N. J., to Albany, N. Y., on April 29. Miss Dalton made the journey to carry a message from Governor Benjamin Strong, of the Federal Reserve Bank, to Governor Smith. It would have been much cheaper to have sent the message by mail, and also quicker, for Miss Dalton and her pilot, C. J. Zimmerman, came near making the world's record for slow flying. This, however, was because whenever Miss Dalton spied anybody down on the ground who looked as if he had the price, she would alight and sell him a Victory Loan bond.

In fact, the whole affair was arranged to boost the Loan. Miss Dalton has been indefatigable in placing bonds where they would do the most good ever since she arrived in New York some days ago. The start was originally scheduled for the Hudson River off the Columbia Yacht club at the foot of Eighty-sixth street. A big crowd had gathered, but before Miss Dalton could make up her mind how much she ought to get out of the bunch, Lieutenant Lloyd Bertrand, who has charge of aeronautics for the Victory Loan Committee, ordered a change to Keyport on account of wind conditions. As it is a good two hours and a half by motor to Keyport, the Eighty-sixth street crowd escaped with its loose change, for the time being, at least.

The start was made from the factory of the Aeromarine Plane & Motor Company at Keyport at 3 p. m. At 8:40 p. m. Miss Dalton handed Governor Smith Governor Strong's message.

After delivering her message Miss Dalton was rushed to various Victory Loan meetings, at each of which she was accorded an enthusiastic reception. At the first meeting she sold $5,000 worth of bonds in three minutes. Other meetings also yielded results so satisfactory that Miss Dalton forgot that she had not had any dinner and that luncheon had inadvertently been overlooked. Next morning she headed a Victory Loan parade in Albany, receiving acclaim which undoubtedly was worth thousands of dollars in bond selling. She returned to New York in the afternoon after the busiest 20 hours in her experience. Now she is an enthusiast on the subject of flying.

FOREIGN NEWS

Peru Establishing Military Aviation School

The Government of Peru is arranging for the establishment of a military aviation school. It is proposed to secure the services of French aviators who have seen service in the war to instruct the Peruvian aviators.

North Sea Service of the Blackburn Aeroplane Company

Directly the bar to civilian flying is removed the North Sea Aerial Navigation Company will begin to operate aircraft between Hull, Esbjerg, and Copenhagen, in Denmark, with three branch services—one north to Gothenburg and Christiania; another north-east and east to Stockholm, Helsingfors, and Petrograd; and the third to Amsterdam and Rotterdam.

Armstrong, Whitworth Co. Made Over 1,000 Aeroplanes

London—The enormous war production of the Armstrong, Whitworth Company is indicated by the following summary of their war production record: 13,000 guns and mountings. (This number, which includes the guns for tanks, represents about one-third of the total national output.) 14,500,000 shells; 18,500,000 fuses; 21,000,000 cartridge cases; 12,500,000 complete rounds of field-gun ammunition; 6,000,000 projectiles, completed and filled; 1,075 aeroplanes; 3 airships; 47 warships; 22 merchant ships; 583 merchant ships, equipped with anti-submarine guns and gear; 100 tanks.

British Entry for French Competition

At least one British entry has been made for the long-distance utility competition which is being organized in France, the British Aerial Transport Co. having entered through M. Pierre Maréchal, one of the B.A.T. commercial machines. It may be recalled that the competition will consist of a flight round France in stages, aggregating 2,500 miles, and the prizes will be awarded according to the showing of the machine under the headings of safety, comfort, lifting power, speed, ratio of weight to speed and cost per ton mile.

Commercial Aviation Attracts Large Capital in India

Plans are going ahead energetically for the establishment of commercial aviation in India, and arrangements are progressing to organize a company with a capital of $15,000,000 to start a number of air routes. The first lines, it is said, will be Calcutta-Delhi-Simla, Calcutta-Bombay, Calcutta-Darjeeling, and Calcutta-Puri. It is expected that the Government will support these enterprises by extending them postal subsidies and helping to provide landing grounds and intermediate stages, of which upward of 200 will be required.

The passenger rate for aeroplane travel is set down tentatively at about 6d. per mile at first, with a probability of a reduction when the organization is working smoothly.

In the Calcutta-Simla route the distance by rail is put at 1,135 miles, occupying forty-two hours, and costing first-class just over £8. By air the distance is 950 miles, the time taken about twelve to fifteen hours, and the fare about £15 17s. The Calcutta-Darjeeling route by rail is 386 miles, occupying twenty-one hours, and the rail fare is nearly £3; by air the distance is 320 miles, the time three and a half hours, and the fare about £4 17s.

French Aviator Carries American Officer from Brussels to Paris in 85 Minutes

Adjutant Larmande, Squadron 472, French Air Service, carried an American officer bearing important diplomatic correspondence from Brussels to Paris in 1 hour and 25 minutes, averaging 125 miles an hour.

Congress of Human Flight in Session at Paris

In 1913 M. F. Roidor-Séville organized the first Congress of Human Flight at the Grand Palais, at which 52 representatives of European countries were present. There was to be another congress, in 1914, but the war intervened. Several members are no more, but the remainder have been convoked and have resolved to continue the good work.

Farman 6-Passenger Planes for Paris-Bordeaux Service

Farman Frères are establishing a Paris-Bordeaux passenger service. An F.50, piloted by Lieutenant Constantin, accommodating six passengers will be used.

French Aviation Appropriation Nearly $200,000,000

After an all-night session, which resulted in the reduction of the appropriation to a figure $3,500,000 less than the original budget, which amounted to $200,500,000, criticism was made of the non-utilization of captured German planes, but it was pointed out that considerable alteration would be required to make these planes fit for commercial use. Unsuccessful efforts were made to take the control of civil aviation out of the hands of the military.

Regular Passenger Service Between Rome and Naples Operating

On April 6th an airship of a large type began a regular passenger service between Rome and Naples. The ship carries 36 passengers.

Swiss Government Aids Aircraft Industry

In order to awaken general interest in aeronautics and to assist the industry, the Swiss government has sanctioned the use of military planes for passenger carrying flight. All flights commence at Dubendorf. The minimum rate is 50 fcs. for a quarter of an hour's flight, but if over 12 kilometers it is 75 fcs., and the same sum is charged for flying over the region situated south of the line Rohrschach-St. Gall-Jonschwil-Wattwil-Uznach-Einstein-Lucerne-Napi-Thoune-Guggisberg Bulle-Dent de Jaman-Bex-Monthet.

Each landing made at the request of the passenger will cost him 25 to 100 fcs., and a supplement of 5 fcs. for each quarter of an hour the machine is kept waiting. A flight from Dubendorf to Lucerne, without any intermediate stops, will be 300 fcs. From Thoune-Jungfrau and return is 500 fcs., whilst the flight Lausanne-Avenches-Neuchatal costs 150 fcs. single.

The authorities are taking no undue risks. Payment must be made in advance, and should the passenger wish to take a camera or cinema-camera with him he must pay another 50 fcs. for each quarter of an hour. Minors must, in the absence of their parents, have a certificate showing their parents' consent to the flight.

In general, all persons under 18 or over 60, or who suffer from heart trouble, anaemia, epilepsy and other nervous maladies are not to be allowed the privilege of flying.

Five Seaplane Carriers in British Atlantic Fleet

The arrangements made for the composition of the British Atlantic Fleet, in full commission—provisional, until the settlement of peace—include the use of five seaplane carriers *Furious, Vindictive, Argus, Pegasus* and *Nirvana*. No mention is made of seaplane carriers with the other fleets and squadrons.

Aero Union of the Transvaal Formed

As an indication that aeronautics is spreading to all corners of the earth, it is of interest to learn that an aero club has been formed in Africa.

At a meeting presided over by the Mayor, at Johannesburg, on March 27, it was decided to form an Aero Union of the Transvaal, the objects of which are "the education of the people in the development and possibilities of aeronautics; to encourage the establishment of aerial services of all kinds; to foster under its auspices the formation of aero clubs in different centers; to associate itself with similar institutions throughout the country, and generally to promote the interests of aviation in this country." Lord Buxton was elected honorary president, and Mr. Sturrock, President of the Chamber of Commerce, was elected chairman.

Work of French Seaplanes in War

The following statement has been issued regarding the work of the French Naval Air Service:

ACTIVITY OF THE SEAPLANES, OCTOBER, 1917—AUGUST, 1918

Month	Number of Flights made	Hours of Flight	Distance covered (miles)	Submarines sighted	Submarines attacked	Mines discovered
1917						
October.....	1,667	3,094	184,730	7	6	..
November..	1,680	3,265	191,000	15	12	..
December..	1,730	2,671	147,000	7	7	..
1918						
January....	2,236	4,139	214,870	7	6	3
February...	2,115	3,690	215,000	8	6	4
March.....	2,210	4,099	237,410	5	7	8
April.....	2,647	4,808	284,920	11	8	8
May.....	3,510	7,652	437,200	22	22	10
June.....	3,365	6,758	387,940	9	11	9
July.....	3,959	7,432	432,000	19	14	12
August.....	4,268	8,594	495,700	20	12	6

British Airmen Fired 10,500,000 Rounds at Ground Targets in War

London, April 24.—The Air Ministry, in a published report of the work of the air force during the war, says that before the war the air force consisted of 272 machines and 1,647 men, while in October, 1918, there were 22,171 machines, 27,006 officers, and 263,842 men.

From July, 1916, to the time of the signing of the armistice, the air force on the western front brought down 7,054 enemy aircraft, dropped 8,042 tons of bombs, and fired more than 10,500,000 rounds at ground targets.

Argentina Watching Aeronautical Developments

According to statements appearing in the British aeronautical press, a large number of aviators who have been discharged from the Royal Air Force have been approached by the Argentine Legation in London with reference to their utilization in the Argentenian Army. Aviators have been warned, however, that no authorization or instructions have been issued to the legation in that connection, but that, on the other hand, the Argentine authorities are very keenly interested in aeronautical developments, especially in relation to military aircraft, and British manufacturers who are at liberty to supply aircraft of war to foreign countries would do well to make their products known to the Argentine Military Authorities. Such photographs, specifications and so forth as are permitted by the Air Ministry to be transmitted to foreign Governments should be sent to the Military Attaché of the Argentine Legation.

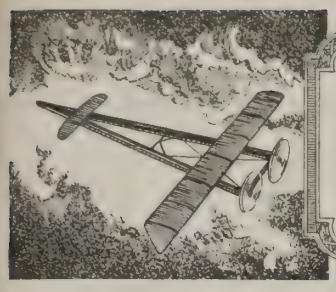
British Airship Patrolled 66,200 Miles in 2,500 Hours Flying Time During War

There have been some wonderful endurance records of British airships during the war. One airship had a life of 2 years 75 days, during which it flew 66,200 miles in 2,500 hours' flying time. Another airship (C2) averaged 100 miles a day during a year—a total of 36,500 miles. In all, the airships of the British Air Force flew 2,250,000 miles during the course of the war.

Bristol Company Builds 14-Passenger Commerce Plane

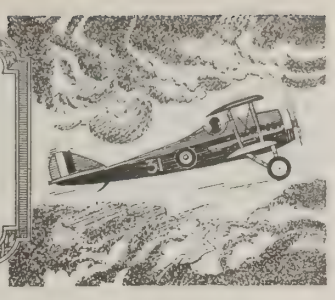
The Bristol Aeroplane Co. of England has constructed a new passenger aeroplane, according to a commerce report from London. The plane has a seating capacity for 14 passengers in addition to the necessary mechanics and pilot. On its trial trip it carried 12 passengers, pilot and one mechanic, climbed 6,200 ft. in 7 min. 15 sec., with an air speed of 125 m.p.h. The passenger salon is ventilated to avoid drafts.

The machine stands 20¼ ft. high and from tip to tip measures 81½ ft. It weights 16,500 lb., the power being sufficient to lift this load to a height of at least 3 miles and at 10,000 ft. to give the aeroplane a speed of 113 m.p.h. The engine houses are built on the middle of the three pairs of wings. On each side there are two 410-h.p. engines, the total power being 1640 h.p. Flight can be maintained by any two of the four engines should the others break down.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



A Scientific Flying Model

WHILE on the subject of flying models, we must not forget one very important type of model known as the Scientific Model or one in which a regular tested wing curve is used.

If you are building models and the only reason you are is the pleasure you get from flying and building these models, I would like to have you start on one like the one shown in the accompanying drawing, as this model is not only a good flyer, but will show many advantages you have never seen in any of your previous models.

Some years ago it was custom among the model clubs and model flyers to have efficiency contests for flying models. The contest was decided by the model carrying the greatest load for a certain surface area, etc. In this way many little things were found that never dawned on us before and the result was we built some of these ideas into our racing models, and made longer and better flights.

I would suggest selecting a certain fixed area, about 144 square inches (as I have in the model shown in the drawing) for the main plane, and about 40 inches in the elevator. This is a fair average for this type of model and the one from which we will get the best results.

Many little experiments can be carried on by the aero-modelist such as using raked edges, then wings without the rake, arrow shaped wings (that is, with a sweep back) with or without a dihedral, or even a reverse dihedral, that is, have the wings sloping downward instead of upward. Different loads can be carried at different angles of incidence and the most efficient angle can then be found.

In fact almost every conceivable kind of an experiment must be taken into consideration and I claim that when you have finished with this model you will be able to build long distance flying models that will go hundreds of feet farther than your previous models.

New tricks in design are what make an aeroplane better and it is not necessary for one to be an expert engineer to invent or develop some little thing that will improve the aeroplane or make aviation safer and more interesting. The field is large and you, the model fliers, have the same chance as those who went before you and who are to-day making aviation history.

The building of the model shown herewith is really simpler than it looks; the only catch is to get the Balsa Wood that is needed for the wings and motor stick.

While the wings look as if there are too many ribs, this is not the case, as we are using a true wing curve and it is necessary to preserve the wing section along the whole length of the wing, otherwise the fabric would cave in between each rib and the wing section would be correct only at each rib.

The ribs of the wings are made of this Balsa Wood. (Balsa Wood is the lightest wood known, its weight being about one-tenth the weight of spruce.) And it can be purchased from almost any model supply house. If your particular supply dealer does not carry it you can purchase it from The American Balso Co., New York City.

To construct the ribs, select a block of the wood and shape it like the wing profile shown at the right hand lower side of the cut.

The wood should be so shaped as to have the grain running the length of the ribs when you finish.

After shaping the wood to the proper wing curve holes should be drilled for spars. Then ribs 1/16" thick should be cut from this block with a saw.

Tne ribs for the elevator are also made in this way and when all are finished they should be run on round spars made of dowel sticks and glued in place. Care should be taken not to split the ribs when putting them on. It would be good practice to make the hole in the ribs a trifle larger than the diameter of the spar. The spars in the large plane are ⅛" and in the elevator 3/32". The entering edge of both elevator and main plane is of 1/32" bamboo rounded with sand paper.

When the wings are finished cover them both sides with thin China Silk or Bamboo paper, and dope with Ambroid Varnish.

The motor stick is made of a piece of Balso Wood 3¼" x ¾" and shaped to the cross section in the centre of the drawing.

One propeller drives the model and this is twelve inches in diameter and is made from a block of clear grained white pine.

Aero Science Club Note

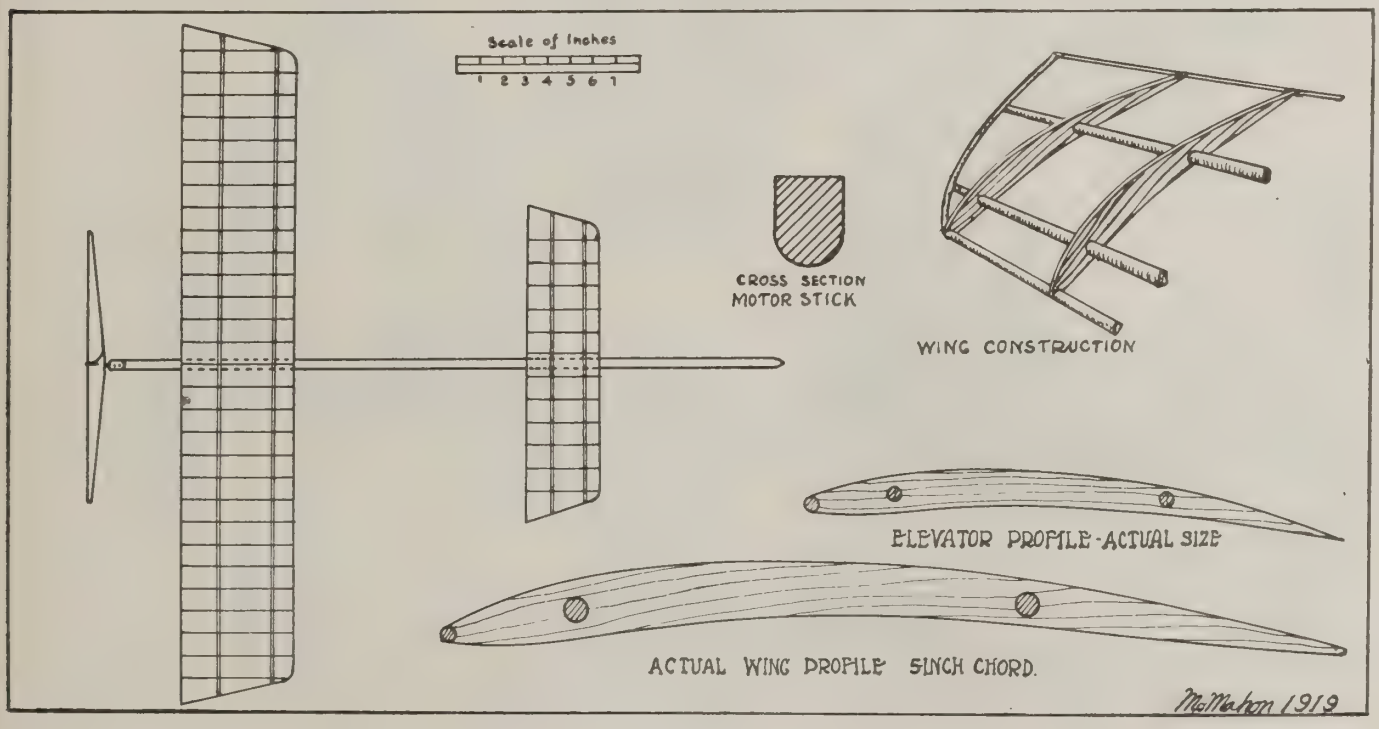
The Aero Science Club recently held its annual meeting and elected the following officers:

Mr. Edward Durant, President; Mr. Arthur N. Ott, Vice-President; Mr. Ladis Gladki, Secretary and Treasurer; Mr. Wm. J. Buch, Director of Model Const.; Mr. Stanley Y. Beach, Director of Pub. and Membership; Mr. Harold McMickle, Technical Advisor.

In order to increase the interest in the power driven model (the record for the compressed air driven model being about 423 feet) the club has decided to offer a suitable cup to the builder and flyer of the first mechanical driven model to surpass the record, in a contest to be held at Van Cortlandt Park, New York City, in the near future.

The club is rapidly recruiting new members and is one of the few "live" organizations as well as the oldest aeroplane club in America.

Applications for membership should be sent to the secretary at the Beach Building, No. 125 East 23rd Street, New York City. Anyone interested in models or model flying is eligible and there is also a Junior division for the younger model enthusiasts.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Aeronautic Journalism

In a newspaper report of the flight of Mr. J. H. Thomas, M. P., to Paris, our contemporary, *Flight,* noted the statement that when Mr. Thomas arrived on the aerodrom "H.M. airliner 'Silver Star,' a twin-engine converted Handley Page bomber, resplendent with new alumminium paint, was ready with the engines running." Mr. Thomas immediately entered the machine and "a moment later the pilot, Major McCrindle, called out 'contact'; the blocks were knocked away from the wheels, and Mr. Thomas was away on his journey."

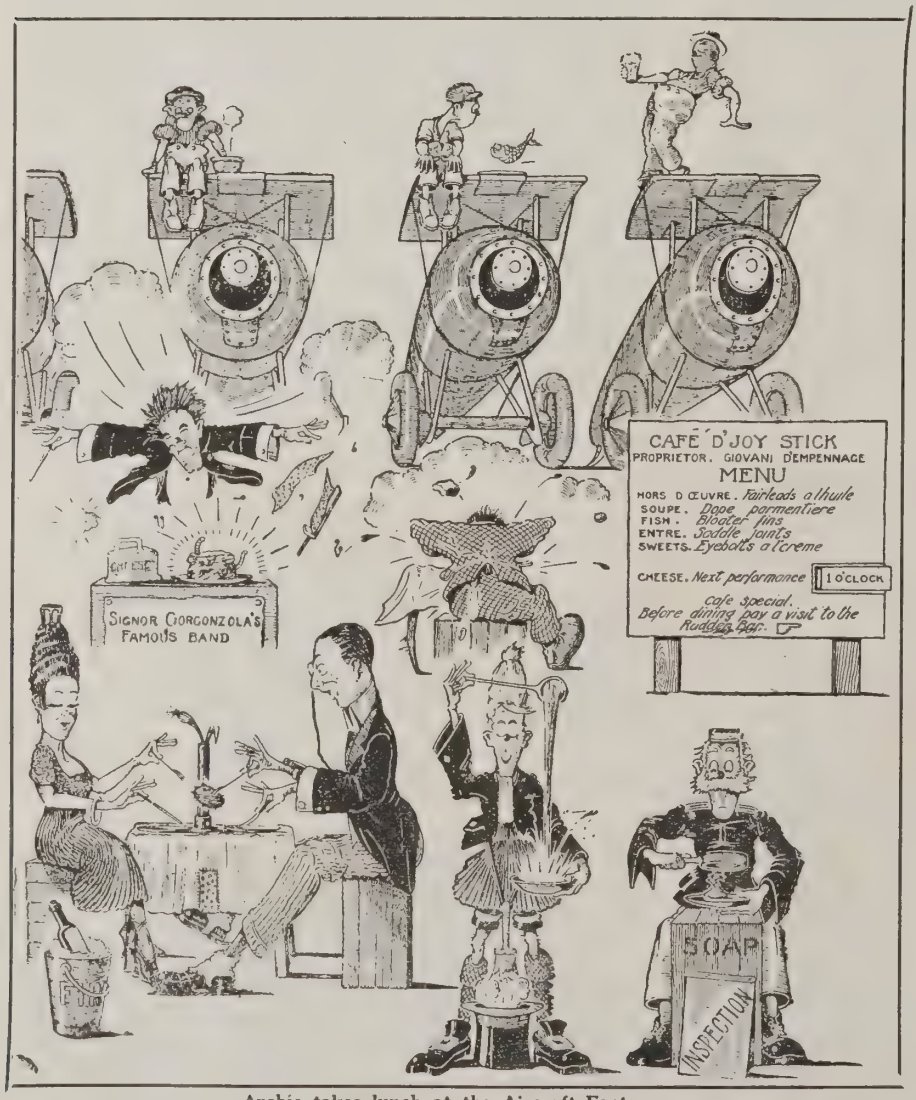
It was thoughtful of the pilot to call out "contact" while the engines were running so nicely with the switch off. And what a voice for the parade ground Major McCrindle must have!

So There's Nothing to Worry About

"Suppose your parachute didn't open, my good man?"
"Ah, let's suppose, madam."
"But what would you do?"
"I should probably 'do' the undertaker, madam. My bank account is fearfully overdrawn."—*From Aircraft.*

Invent One for Both

She: "Do you think women will take to the air?"
He: "Not for five or six years."
She: "Why?"
He: "Because it will take that time to evolve a perfect silencer for the engines."
(Dear Reader: We ran short of jokes this week, so please excuse this one.—NUTTY EDITOR.)



Archie takes lunch at the Aircraft Factory

—*From Flight.*

Quentin Roosevelt

Birdman who gave up your life,
For the noblest cause in the world,
Aiding the world in its strife
For the fairest flag unfurled.
Liberty credits you,
Who fought for us in the blue—
You who have given all
Without a word of protest;
Who answered the final call,
And went to a glorious rest—
No enemy hated you,
Warrior who winged the blue.

For who could question the cause,
And see its leader's sons
Never thinking to pause,
While sons of leading Huns,
Knew naught of do nor dare,
Or conquest in the air?

The Huns have spoken to me
And have said it time and again,
That you were one of a free
And undaunted union of men.
That your name would ever live,
With a halo shining bright;
That your life was given to give
That the wrong might learn the right.
Now we are learning today,
That which you knew before—
That the life which you gave away,
Was *not* a loss in the war.

—*Arthur Winfield Scott,*
2nd A. I. C., France.

At the Scratch

The butterfly
Has Wings of gold;
The firefly
Wings of flame;
The Cootie
Has no wings at all
But
He gets there just the same!

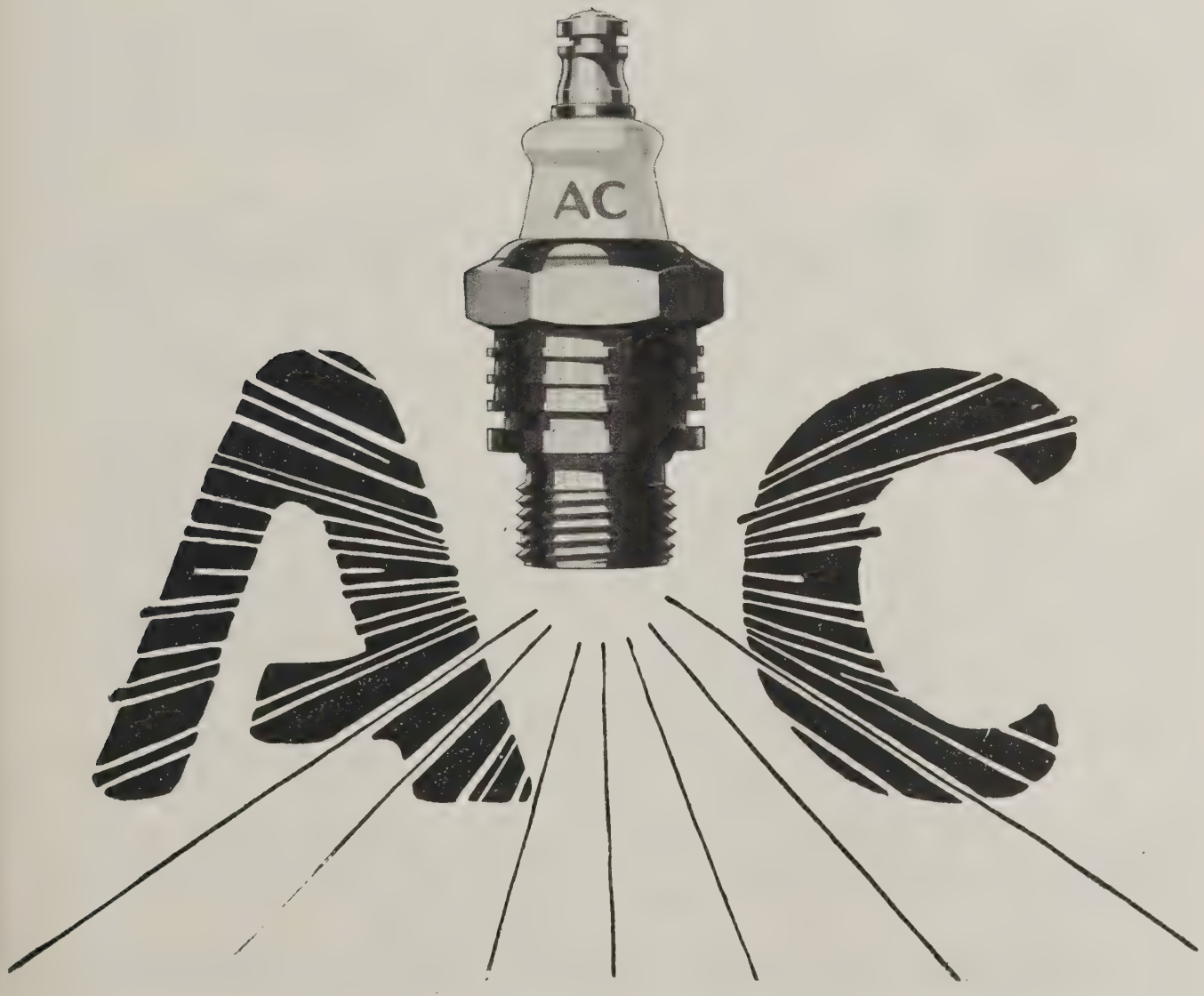
A C Spark Plugs have always met the emergency. For years they have been standard equipment on most fine motor cars. When the government needed aircraft plugs A C's led all others in the competitive tests and as a result were chosen as standard equipment for all Liberty and Hispano-Suiza airplane engines. We are now in position to execute private orders for aviation plugs promptly.

Champion Ignition Company, FLINT, *Michigan*

U. S. Pat. No. 1,135,727, April 13, 1915. U. S. Pat. No. 1,216,139, February 13, 1917.
Other Patents Pending

The Standard Spark Plug of America

Aviation Type



AEROPLANE INSURANCE

Merchants Fire Assurance Corporation of New York

announces the appointment of

MR. AUSTEN B. CREHORE

as Manager of their newly established Aviation Insurance Department.

Mr. Crehore was for two years a Pilot of the Lafayette Flying Corps and is an insurance man of considerable experience and for these reasons we consider him especially qualified to manage this branch of insurance. We are therefore prepared to furnish all forms of aerial insurance coverage, and quotations will be gladly given and full information submitted.

MERCHANTS FIRE ASSURANCE CORPORATION OF NEW YORK
45 JOHN STREET, NEW YORK CITY

FIRE—AUTOMOBILE—TORNADO—EXPLOSION—RIOT AND CIVIL COMMOTION

The Royal Flying Corps

used over eight thousand quartered oak, variable pitch, Paragon Propellers—all of one design. Not one of these propellers was ever returned as unsatisfactory from the field. Only four failed to pass final inspection. Average shipment was 200 per week on this order alone. In October 1918 official tests showed two miles per hour faster speed and one third faster climb than any one of four competing designs. The new Paragon Booklet will tell many more interesting things.

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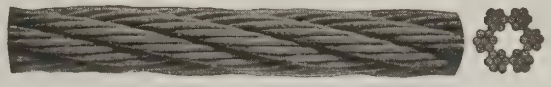
ROEBLING
7 x 19 TINNED AIRCRAFT CORD.



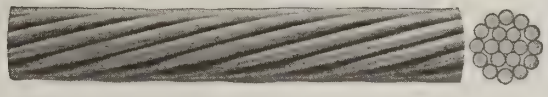
ROEBLING 7 x 7 (WIRE CENTER)
GALVANIZED AIRCRAFT CORD.



ROEBLING 6 x 7 (COTTON CENTER)
GALVANIZED AIRCRAFT CORD.



ROEBLING 19-WIRE GALVANIZED
AIRCRAFT STRAND.

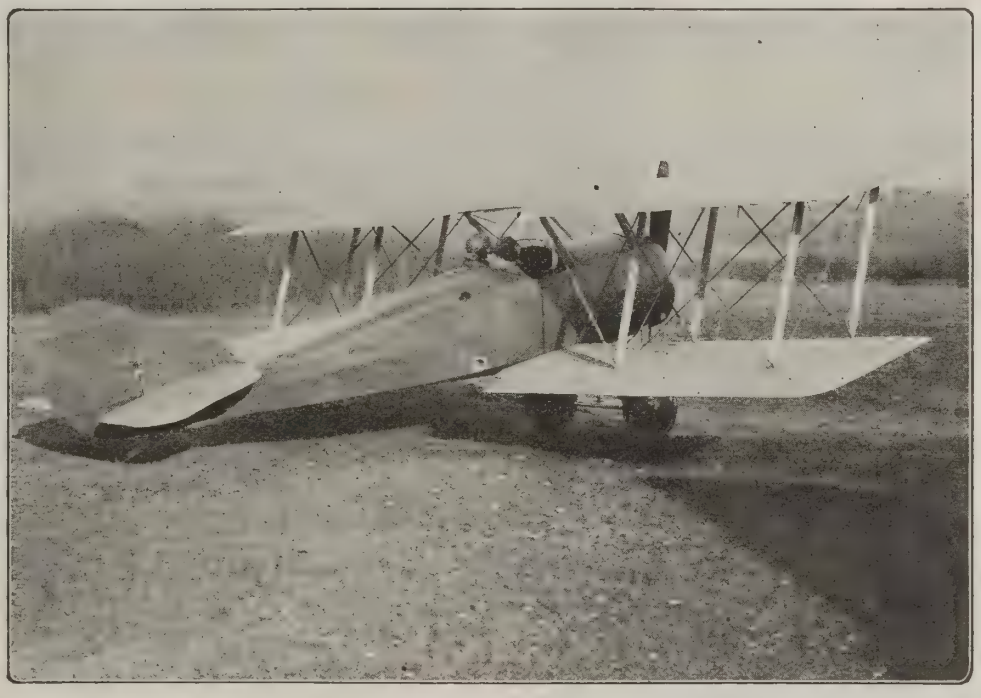


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Equipped with 80 h. p. Le Rhone Engine.

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Landing speed, 35 M. P. H.

Climb 6,700 ft. in first ten minutes.

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We are sure you can profit by the information and advice which we are able to give you by reason of our experience in propeller designing. If you will give us an opportunity to fit your motor and plane with the proper propeller, we are quite confident we can extract every ounce of thrust your motor will develop and all the speed of which your plane is capable.

We are able to back up the above statements by the performance records of planes designed by some of the best Aeronautical Engineers in this country.

Hartzell Walnut Propeller Co., Piqua, O.



MARTIN BOMBER

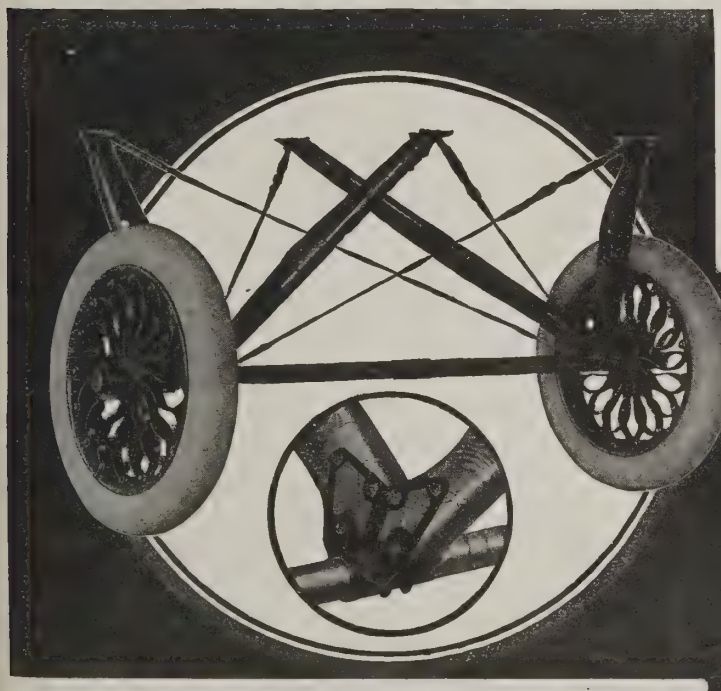
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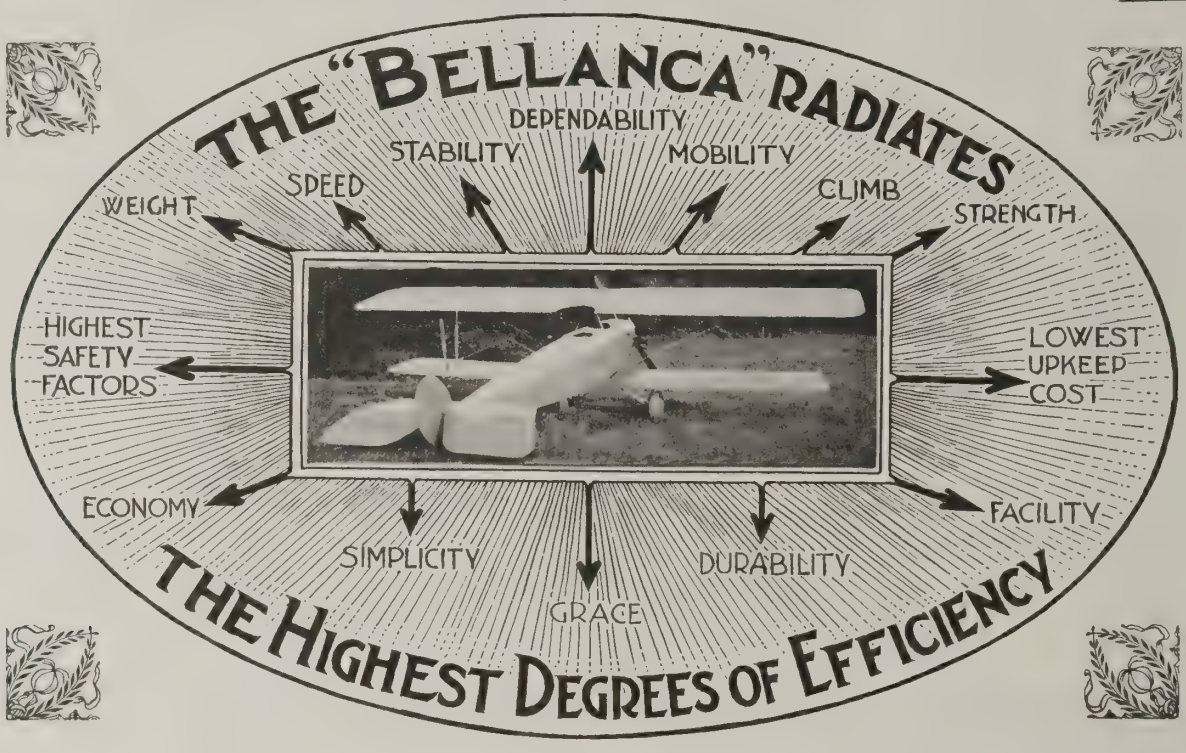
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14

FOURTEEN VITAL POINTS
THAT MUST DOMINATE IN THE RECORDING OF
THE (AERONAUTICAL) HISTORY OF THE U. S.

14



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Aircraft Manufacturers Hagerstown, Md.
SPECIFICATIONS AND ALL INFORMATION ON REQUEST:-
Harry E. Tudor Sales Manager 299 Madison Avenue New York City

(*Continued from page* 443)
have to be carried, and in spite of the lower power the speed is over 100 m.p.h. A military Martinsyde machine with the same engine is the holder of speed records for machines of this type, and it may safely be assumed that the trans-Atlantic type is not inferior in any way to the standard type.

The Fairey Machine

The machine entered by the Fairey Aviation Co. has the distinction of being the only seaplane entered. It is of more or less standard type, resembling the well-known type of 3C Fairey seaplane. The most remarkable feature of this machine is, of course, the variable camber wings fitted. This forms a Fairey patent, and has been used with good results on machines employed by the Navy. Briefly speaking, the variable camber is obtained by having the entire trailing edge of the planes hinged along the rear spars in such a manner that the pilot can, by turning a wheel, pull down the whole trailing edge to give greater lift, and again raise it to provide less resistance and hence greater speed. In the ordinary way the chief aim of this variable camber is to provide a low speed on alighting and getting off, but for the Atlantic flight it will also be found useful in providing greater lift while the machine is heavily loaded, allowing of gradually flattening out the wing section as the load becomes less owing to the fuel being consumed. In this manner the first part of the flight will probably be made at a slower speed than that obtained towards the finish of the journey. The engine is, as in two of the other machines entered, a Rolls-Royce "Eagle" of 375 h.p., and the speed of the machine is stated to be about 120 m.p.h. This figure probably refers to the speed with the trailing edge in line with the rest of the wing section. With the trailing edge pulled down the speed will be considerably lower.

The Whitehead Machine

We have not, for the moment, been able to obtain any particulars of the machine the Whitehead firm propose to use, and can only wait until Mr. Whitehead is prepared to disclose the type with which they may make a bid for the prize.

The Handley-Page Machine

The Handley-Page machine is one of the standard type four-engined bombers, slightly altered in details, and fitted with a very large petrol tank in the fuselage. The four engines—in this case Rolls-Royce "Eagles"—are placed between the planes, one behind the other. The front engine of each pair drives a tractor screw, while the engine behind it drives a propeller. As the pusher screw has to deal with air already set in motion by the tractor, its pitch is made slightly greater than that of the tractor.

The amount of fuel carried will be about 2,000 gallons. Assuming that each engine develops 365 h.p., and that the fuel consumption is .5 lb. per h.p. hour, this amount of fuel should last for 21 hours at open throttle. The speed at full power may be expected to be in the neighborhood of 100 m.p.h., which would give a range of about 2,100 miles. Since, however, the machine will fly at a somewhat lower power for the sake of fuel economy, and the prevailing winds are westerly at this time of the year, it is reasonable to suppose that this speed of 100 m.p.h. may be maintained with the engines partly throttled down, thus further increasing the margin in hand. After a few hours' flight two of the four engines will probably be sufficient to keep the machine going, although at a reduced speed, and this would give the engineers a chance to put right any little defect that one or more of the engines might develop. The number and names of the crew have not yet been announced, but one of them will be a Marconi operator, who will attend to the directional wireless set, which will have a range of about 250 miles. An installation of smaller radius will also be carried to facilitate communication with ships. To provide for emergencies, a small wireless set is installed in the tail of the machine. The reason for placing it here is that in case of a descent in the sea, the tail will probably stick up out of the water, thus enabling S. O. S. messages to be sent. In view of the fact that four engines are fitted, it is improbable that complete engine failure will be encountered.

The following brief particulars of the Handley Page machine should be of interest:

Span, 130 ft.; length, 75 ft.; height, 23 ft.; weight, empty, 14,000 lbs.; weight, fully loaded, 32,000 lbs.

UNIVERSITY OF ILLINOIS-U.
OCT 20 1919

AERIAL AGE WEEKLY

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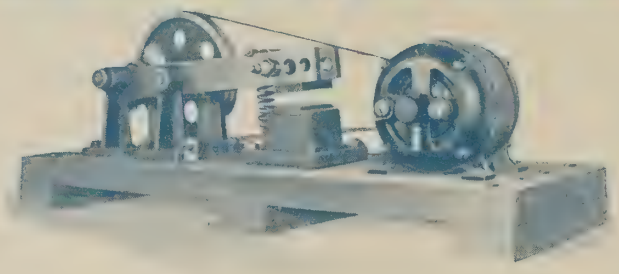


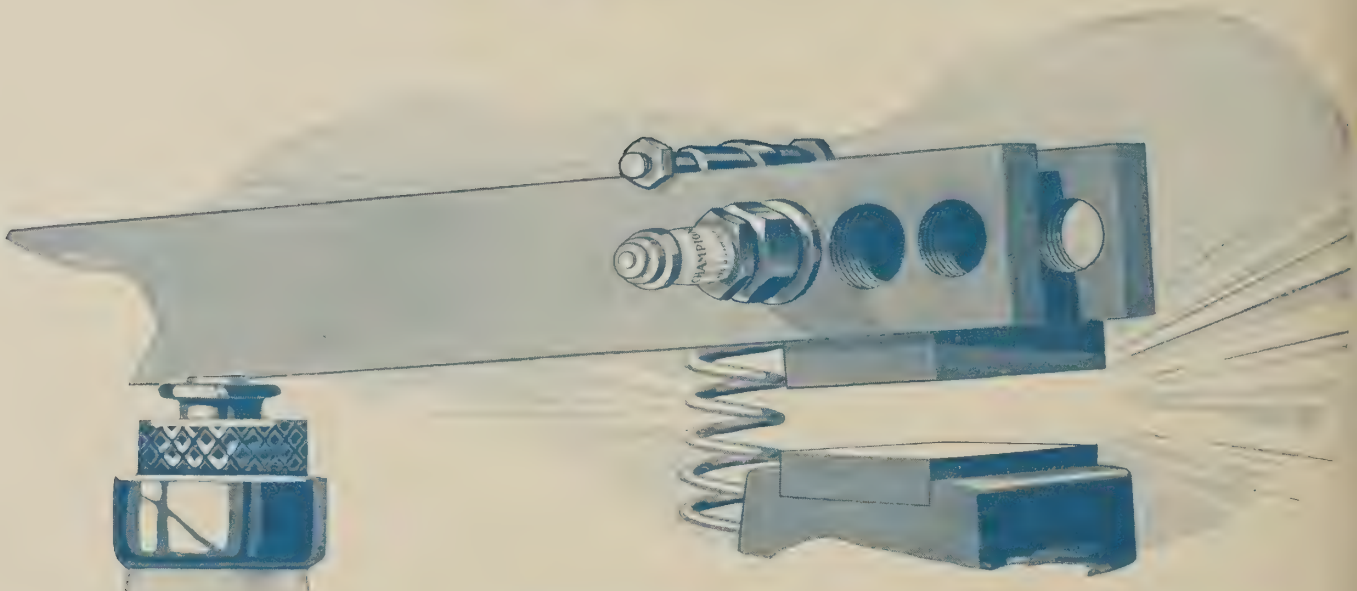
An Aerial View of the Downtown Section of New York City

Second Pan-American Aeronautic Convention Discusses Aeronautic Problems of Great Importance

ISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY
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Champion Aeroplane Plug

Withstand Shocks of 300 Sledge Hammer Blows Per Minute

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The test illustrated here is known as the "shock test." The shock, which the Champion Spark Plug must survive without injury, is the equivalent to a weight of 3½ pounds, dropping with the rapidity of 300 times per minute.

The qualities that enable Champion Spark Plugs to successfully withstand such severe trials are largely a result of ten years' study and experimenting that developed our patented gasket construction and our Number 3450 Insulator.

This superior Insulator offers 2½ times the resistance to shock and vibration compared with the best previous insulator. That is one of the several reasons why Champion Spark Plugs are more durable and dependable than ordinary spark plugs.

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VOL. IX NEW YORK, MAY 19, 1919 NO. 10

SECOND PAN-AMERICAN AERONAUTIC CONVENTION DISCUSSES AERONAUTIC PROBLEMS OF GREAT IMPORTANCE

Meetings and Field Events Well Attended

VISITORS from all sections of the United States and from twenty other nations have been present at the meetings, field events and contests of the Second Pan-American Aeronautic Exposition at Atlantic City during the past week, notwithstanding the somewhat adverse weather conditions.

R-34 to Make Atlantic Trip

Official word that the R-34, one of the new type British dirigibles, is slated to make a trans-Atlantic dash within the next three weeks, was given at the "inside" dedication of the Atlantic City Air Port—a luncheon given in honor of Brig.-Gen. L. E. O. Charlton, British Air Attaché, and the first officer in the world to be appointed to such a post.

The luncheon, held in the submarine grill of the Hotel Traymore was notable for the representative aerial experts of many nations who were at the table as well as the message of Gen. Charlton that the Atlantic City Air Port was the probable destination of the British dirigible now undergoing final tuning up for the big hop to American shores.

"It is intended to send a dirigible across to this coast this month or, if some unforeseen holdup occurs, as early as possible next month," Gen. Charlton said. "As to the actual terminus, I have strong hopes it will be Atlantic City, although I have not received any official notification of the landing place so far."

It is believed, however, that the world's first air port will receive the honor because of the strong invitation that has been sent to the British Air Ministry and by reason of the cordial relations early established by the General with the officials of the Aero Club of America, the Aerial League, the Pan-American Aeronautic Federation. In the course of his speech Gen. Charlton said:

"I might prognosticate that the era of aerial trans-Atlantic bridge building is today having its foundations laid. Heretofore the oceans have been the sole connecting link between the Americas and Europe but the time when the air will unite them is now very near.

"I have visited your great air port here and been impressed with its wonderful facilities and possibilities. Atlantic City is a happy augury. Its cosmopolitan roster of visitors assures wide dissemination of the aerial developments that are bound to be an integral part of the resort's life in the future through the splendid courage and confidence of the men responsible for the creation of this port.

"Aviation is the new child of civilization. The steam engines and all the rest—the means of transportation to which we have been long accustomed—are its elder brother. In the short span of time covered by the period of the war we have jumped from the activities of that elder brother until now fighting in the air is the rule rather than the exception; parachutes have been tested and found to be in fact the life preservers of the air, adding to the safety of air travel and giving the general public the confidence in the greatest creation of mankind; night flying is something common now—the infant new-born when the armistice was signed has now reached the age of reason, adolescence and maturity are of the near future."

President Alan R. Hawley, who presided at the dinner which was substituted for the outside ceremonies in the dedication of the big air port when inclement weather interfered, referred to the fact that Atlantic City was the base of the first effort at a trans-Atlantic aerial dash by dirigible back in 1911 when Walter Wellman, the explorer, made a start from the inlet here in a "blimp" only to bump into storms at sea that swept the aerial leviathan down the coast where the crew was finally rescued from the peril of the elements and of the second effort a year later when Melvin Vanamin, who was chief engineer for Wellman, met with disaster while testing out finally over the inlet for the voyage overseas.

International notables who were introduced at Dedication Dinner at the Traymore included Mr. Alan R. Hawley, president of the Aero Club of America, Brig.-Gen. L. E. O. Charlton, C.B., C.M.G., D.S.O., and Legion of Honor, General Collardet, French High Commission, Colonel T. E. Gilmore, O.B.E., Assistant British Attaché, Captain Pierre Edgarde Bos, French High Commission, Captain Dibovsky, Russian Navy Aviation Service, A. Touchkoff, Commander, Russian Navy Aviation Service, Captain Harold Sylwan, Military Attaché Swedish Legation, Captain Stellan Elliott, Royal Swedish Commission, Lieutenant Santiago Campuzano, Cuban Air Service, Captain C. L. Berriso, Military Attaché, Uruguayan Legation, Honorable Harry Bacharach, Mayor of Atlantic City, Mr. Albert T. Bell, president Aero Club of Atlantic City, Mr. Henry Woodhouse, vice-president Aerial League of America, Major Reed G. Landis, second ranking American Ace, Rear-Admiral Bradley A. Fiske, U. S. N., Captain Robert A. Bartlett, Captain Granville A. Pollock, Lieutenant Marion Sulzberger, Lieutenant (j. g.) C. H. Payne, U. S. N., Lieutenant G. W. Shaw, U. S. N., Mr. Edward Stinson, Mr. Earl L. Ovington, Ensign A. A. Beckwith, Mr. Samuel P. Leeds, chairman Atlantic City Chamber of Commerce, Captain Hugh L. Willoughby, Mr. Augustus Post, secretary Aerial League of America. Mr. W. W. Young, Mr. Charles E. White, Mr. George F. Kerr, Mr. Walter Buzey, Mr. Daniel S. White, Mr. Hubert Somers, Mr. Harry B. Cook, Mr. C. A. Clausson, Mrs. May Brown-Dietrich, Mrs. Robertson, Mrs. Brown J. White, Mrs. D. F. White, Mrs. Emery Marvel, Mrs. V. T. Middleton, Mrs. Harry B. Cook, Mrs. Hubert Somers, Mrs. J. H. Lippincott, Mrs. John R. Schermerhorn, Mrs. Wm. H. Peters, Mrs. A. S. Abell, Mr. A. S. Abell, 3d, Mr. George Wm. Abell, Miss Mabel Abell, Miss Anna Abell, Miss May Abell.

Establishment of Engineering Experiment Stations Advocated

Establishment of engineering experiment stations in each state and territory of the country to do for engineering, industry and science what the agricultural experiment stations have been doing for agriculture and the farmers during the past thirty years, was advocated at a meeting on the Steel Pier by P. V. Stephens, of New York, consulting engineer for the Georgia School of Technology.

Mr. Stephens, who is the author of what is to be known as the Smith-Howard bill that will be introduced and pushed in the special session of Congress, covering the subject, declared that such a mobilization of the nation's resources and the training of research men would have frightened Germany off from any acts that would have brought America into the war.

"The university and technical school has and always will be the chief source of all new scientific truths and men trained in the science of engineering. The sooner the courses of aviation are in the colleges the quicker we will see aeronautics take its true place in the civic and industrial life of the nation. A chain of experiment stations of an engineering and industrial character in every state, with each commonwealth probing into its own peculiar resources and the central control located in one of the departments at Washington, with both the state and Federal Government financing the stations, would so mobilize the nation's industries that America's position as the world's leading nation would be permanently established.

"Our agricultural industry was so well systematized that without much additional expense over the regular annual appropriations we were enabled to not only feed ourselves but the world in addition during the world period," Mr. Stephens declared.

The bill has the backing of the executive committee of the Aero Club of America.

Navy Congratulated on Trans-Atlantic Start

Enthused over the progress of the trans-Atlantic "hop" of the big Navy seaplanes, delegates and members of the Second Pan-American Aeronautic Convention adopted resolutions, felicitating the Navy and the members of the overseas crew upon their successful completion of the first two legs of the voyage.

The resolution which was adopted amid cheers at an afternoon session of the convention read:

"The officers, delegates and members of the Second Pan-American Aeronautic Exposition, now in convention assembled at Atlantic City, send you God-speed, good luck and best wishes for a successful voyage with greetings from the new world to the aviators of the old."

The message bore the signature of Alan R. Hawley, president of the Aero Club of America, who was the author. The message was cabled to Trepassey, N. F., to the commanders of the airships.

Resolution of Condolence

The convention today also adopted resolutions of sympathy to General C. T. Menoher, chief of the Air Service, over the death of his wife. The resolution declared:

"Whereas, the officers, delegates and members of the Second Pan-American Aeronautic Convention have learned with extreme sorrow of the death of Mrs. Menoher, it is resolved that the earnest and profound sympathy of the Second Pan-American Aeronautic Convention be extended to General Charles T. Menoher to whom our every condolence is extended at this time of his great loss."

"Mother's Day" Memorial Service

Posthumous honors for the 935 gallant Americans who lost their lives while fighting the battles of civilization and humanity in the air were awarded by the Pan-American Aeronautic Convention as the feature of "Mother's Day"—the diplomas, following the reading of the roll of honor from the platform of the convention by Secretary Augustus Post, of the Aero Club of America, being forwarded to the mothers or wives of the dead heroes.

Forty different states were represented among the 935 airmen whose memory was honored by the impressive services on the pier, when the Memorial Committee, consisting of Rear Admiral Robert E. Peary, Alan R. Hawley, Captain Robert A. Bartlett, Captain Granville A. Pollock, Rear Admiral Bradley Fiske, U. S. N., Major Reed Landis, Albert T. Bell, Thomas F. Powers, John Hays Hammond, Jr., Colonel Lester Jones, U. S. A. M. S., Colonel J. DeM. Thomson, Colonel Charles Elliott Warren, Major Thomas S. Baldwin, Henry Woodhouse, Joseph A. Steinmentz, K. M. Turner, W. W. Niles, G. Douglas Wardrop and A. S. Abell, 3rd, presented their report through Mr. Post.

The awards, from the Aerial League of America, read: "This diploma of Honor of the Aerial League of America is awarded to ....., in recognition of the patriotic service which he rendered to the cause of humanity and civilization in the service of the United States during the war" and bore the signature of Robert E. Peary, as president.

Aerial Mail Day

Aerial Mail Lines had their inning Wednesday at the Convention. Although unfavorable weather conditions prevented the delivery of the first bag of mail to the shore post office by use of a parachute dropped from an aeroplane in demonstrating how this means of "smashing" can expedite delivery by permitting the mail pilot to continue on his route in full wing instead of making stops as now necessary. Interesting facts regarding the success that has attended the air post not only in America but on long hauls in and between other countries were revealed in lectures at the convention hall. The experiments that have been in progress at the air port since the opening of the convention a week ago by Lieutenant Jean Ors and his parachutes, as well as the drops made by A. M. Watkins, a Seattle parachutist, have been convincing proof of the practicability of the "floating" method of delivery will be made of postcards written at the air port, carried through the air by Eddie Stinson and dropped in a mail bag at the Atlantic City Post Office where they will be taken in charge by officials and forwarded by the regular channels.

In checking up on the work of the skyline post as conducted by the United States Postal authorities, W. W. Young, in a lecture pointed out that the air plan was working out on a very business-like basis. He showed that despite the 50 per cent. increase in the amount paid pilots, helpers and mechanics, and the extra cost of rebuilding one machine and entirely overhauling two others, the cost of operation had been reduced 6 per cent. in April over March. That the Government has at last located the types of machines peculiarly adapted to the mail service is indicated in the report from a recent checkup which shows that but four of the sixteen original types placed in the service at the start are now being used. He also observed that clinching evidence of the growing interest and popularity of the air mail service is shown by the fact that the mileage is increasing at the rate of a thousand miles a month.

Lieutenant Edgar Garland, of the Royal Air Force, discussed the developments of aerial mail in New Zealand and Australia, and prophesied a great future for the service. Pilots Gardner and Shank, of the U. S. Aerial Mail Service, related some of their experiences.

Extensive Art Exhibit

The largest aeronautic art exhibit ever held has been assembled on the Steel Pier, Atlantic City, being part of the Second Pan-American Aeronautic Exhibition and Convention.

The twenty official paintings of aerial warfare by Lieutenant Charles E. Ruttan, the official painter of the U. S. Navy, who has just returned, are shown for the first time. There is also exhibited the hundred aerial warfare paintings of Lieutenant Henri Farre, the official painter of the French Army and Navy Departments.

American Balloon Progress

The tremendous strides made in dirigible construction during the past few years were enumerated by R. H. Upson, of the Goodyear Company, speaking before the evening session of the Congress at the Steel Pier. "Since 1911 the improvements worked out in the dirigible industry have been over 2,000 per cent.,". Mr. Upson declared. "The war has helped but the big interest taken by manufacturers in the practical features of the giant 'blimp' for commercial purposes has also had considerable to do with the refinements that are now in evidence.

"But despite the improvements of the past eight years, the end is not yet in sight—the 'ceiling' of improvements has not even been scraped. Right now the construction of a dirigible of ten million cubic feet hydrogen capacity is under consideration and dirigibles of large carrying capacity, capable of making a speed of over one hundred miles an hour are realities of the near future."

Mr. Upson, who won the International Balloon Race in 1913 and has just returned from Europe, brought out the possibilities and value of the dirigible for commercial uses.

He asserted that Great Britain has outstripped all other nations in dirigible construction, pointing out that where the

(*Continued on page* 512)

TROPHIES AND PRIZES TO BE COMPETED FOR AT ATLANTIC CITY IN MAY

THE following Trophies and Prizes have been offered for competition at Atlantic City, and from other points to Atlantic City from May 1st to May 31st. All contests are open to Army, Navy, Aerial Mail and civilian aviators.

(1) **$6,000 Curtiss Marine Flying Trophy.** Mr. Glenn H. Curtiss has offered a prize of $1,000 to go to the first entrant for the Curtiss Marine Flying Trophy who covers the distance of 1,000 miles without stopping. The contest for this prize will open on May 1st, and continue until it has been accomplished.

The entrants who wish to compete for this trophy and prize during the Convention can fly over the 60-mile course between the Steel Pier and Cape May Air Station. This magnificent trophy is exhibited at the Art Salon on the Steel Pier.

The entrant's record will be counted as a flight for the Curtiss Marine Flying Trophy and $1,000 under the rules for the 1919 competition for this trophy.

(2) **The $5,000 Pulitzer Trophy,** offered for annual competition, to be awarded this year to the aviator who makes the best record in flying land or water planes from anywhere to Atlantic City, and from Atlantic City to anywhere during the month of May.

Competitors for this trophy will start from or end at the Atlantic City Air Port, on Albany Avenue, Atlantic City, which affords unsurpassed facilities for both land and water aeroplanes.

(3) **The Boston Globe Trophy and $1,750** cash prizes to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record in flying from Atlantic City to Boston, or from Boston to Atlantic City during the month of May; $500 and $250 to the aviators who make the second and third best records, respectively.

Start or ending will be on the Atlantic City Air Port.

(4) **The Cleveland Plain Dealer Trophy and $1,750** cash prizes to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record flying from Atlantic City to Cleveland, or from Cleveland to Atlantic City during the month of May; $500 and $250 to the aviators who make the best records, respectively.

Start or ending will be on the Atlantic City Air Port.

(5) **The Detroit News Trophy and $1,750** cash prizes to be awarded as follows: $1,000 and the trophy to the aviator who makes the best record flying from Atlantic City to Detroit, or vice versa, during the month of May; $500 and $250 to the aviators who make the best records, respectively.

Start or ending will be on Atlantic City Air Port.

(6) **The Atlanta Journal $1,750 prizes,** to be awarded to the three aviators who make the best record flying from Atlantic City to Atlanta, Georgia, carrying the Journal.

Start or ending will be on Atlantic City Air Port.

(7) **Colonel William A. Bishop's "Ace of Aces Trophy,"** to be awarded to the aviator who makes the best record in flying from Toronto to Atlantic City, or vice versa, during the month of May.

Start or ending will be on Atlantic City Air Port.

(8) **The $3,000 New York Herald Aero Efficiency Prizes,** to be awarded as follows: $1,000 to the aviator who covers the greatest distance in a non-stop cross country flight, starting from or ending at Atlantic City between May 1st and May 30th with an aeroplane of any horsepower.

$250 to each of the aviators who cover the greatest distance in a non-stop flight from or ending at Atlantic City between May 1st and May 30th with aeroplanes of:

(a) not over 100 h.p.
(b) not less than 100 h.p. and not over 200 h.p.
(c) not less than 200 h.p. and not over 400 h.p.
(d) not less than 400 h.p. and not over 600 h.p.
(e) not less than 600 h.p. and not over 800 h.p.
(f) not less than 800 h.p. and not over 1000 h.p.
(g) not less than 1000 h.p., and over without limit.

Start or end of flight will be on Atlantic City Air Port.

(9) **$2,000 Intercollegiate Seaplane Speed Trophy,** for annual competition, to be awarded to the college whose representative makes the best record in flying ten times over a five-kilometer course at Atlantic City each Saturday off the Steel Pier during the month of May.

This trophy is to become the property of the college that wins it three years in succession.

(10) **$2,000 Intercollegiate Aeroplane Trophy,** for annual competition, to be awarded to the college whose representative makes the best record in flying ten times over a five-kilometer course at Atlantic City each Saturday during the month of May. To be held at the Atlantic City Air Port.

This trophy is to become the property of the college that wins it three years in succession.

(11) **$2,750 Cash Prizes for Intercollegiate Weekly Seaplane Races,** offered under the terms of the will of Mr. Samuel H. Valentine. These prizes are to be awarded in connection with the races for the Intercollegiate Seaplane Trophy described above. They are offered to assist the collegiate aero clubs and individuals making the entries to defray the expenses connected with entering a team. Competing for same will not, therefore, endanger the amateur status of the competitor.

There will be four prizes awarded each Saturday for the best speed made in competition for the annual Intercollegiate Seaplane Trophy as follows:

First prize	$250
Second prize	150
Third Prize	100
Fourth Prize	50

Colleges are permitted to appoint new entries and enter different machines for each race. The name of the entrant and type of machine need not be announced until half hour before the race.

(12) **$2,750 Cash Prizes for Intercollegiate Weekly Aeroplane Races,** offered under the terms of the will of Mr. Samuel H. Valentine, are to be awarded in connection with the weekly races for the Intercollegiate Aeroplane Trophy described above. They are offered to assist the collegiate aero clubs and individuals making the entries to defray the expenses connected with entering a team. Competition for same will not endanger the amateur status of the competitors.

There will, therefore, be four prizes awarded each Saturday for the best speed made in competition for the Annual Intercollegiate Aeroplane Trophy, as follows:

First Prize	$250
Second Prize	150
Third Prize	100
Fourth Prize	50

Colleges are permitted to appoint new entries and enter different machines for each race. The name of the entrant and the type of the machine need not be announced until half an hour before the race.

(13) **The Intercollegiate Dirigible Trophy.**
This may not be held until later in the season.

(14) **The Intercollegiate Balloon Trophy.**
This may not be held until later in the season.

All of these contests, except the intercollegiate, are open to Army, Navy, Marine Corps, intercollegiate and civilian aviators. The rules are similar, so that a competitor can compete for more than one trophy in one flight.

The intercollegiate contests are open to both graduates and undergraduates.

(15) **Open Seaplane Speed Contests** (with handicap) for twelve laps of five miles each. To be held on Decoration Day. Prizes to be awarded under the terms of the will of Samuel H. Valentine and sanctioned by the Aero Club of America.

First Prize.....$1,000
Second Prize..... 500
Third Prize..... 250

(16) **Aerial Commuting Prizes.**

1. To be awarded to entrants who cover the greatest total distance in commuting by air from anywhere to Atlantic City during the period of the Convention.

First Prize.....Gold Medal
Second Prize.....Silver Medal
Third Prize.....Bronze Medal

(Distance to be measured in straight line.)

2. To be awarded to entrants who make the greatest number of trips in commuting by air from anywhere to Atlantic City during the period of the Convention.

First Prize.....Gold Medal
Second Prize.....Silver Medal
Third Prize.....Bronze Medal

3. To be awarded to entrants who make the longest flight in commuting from anywhere to Atlantic City during the period of the Convention. (Distance to be measured in straight line.)

First Prize.....Gold Medal
Second Prize.....Silver Medal
Third Prize.....Bronze Medal

(17) **$2,000 Opening Day Prizes,** offered under the terms of the will of Samuel H. Valentine for land aeroplanes and seaplanes. To be awarded to the aviators making the best records in competing for any of the trophies and prizes on May 1st, flying from Atlantic City to anywhere, and from anywhere to Atlantic City. Competitors starting from Atlantic City will start from the Municipal Air Port at Albany Avenue, Atlantic City. Competitors from other points will end their flights at the Air Port.

(18) **$500 Aerial Runabout Races,** offered under the will of Mr. Samuel H. Valentine for speed competition between one-seater aeroplanes of not over 75 h.p. Two races are to be held as follows:

First race, Saturday, May 10th, at the Atlantic City Air Port, Albany Avenue, Atlantic City:

First Prize..... $250
Second Prize..... 150
Third Prize..... 100
Fourth Prize..... 50

(19) **The Akron Trophy,** presented by Major Thomas S. Baldwin, to be presented to the pilot who makes the best time with any type of aircraft in flying from Akron to Atlantic City, or Atlantic City to Akron, during the month of May.

Start or landing must be made on the Atlantic City Air Port.

(20) **$100 West Point Merchants' Association Prize,** to competitor of Pulitzer Trophy who starts from or ends at West Point, Mississippi.

(21) **Woman's Trophy for Flying,** offered by Mrs. May Brown-Dietrich, through the Aerial League of America, for competition by women under rules to be drawn by the Contest Committee.

DAILY PROGRAM FOR PAN-AMERICAN AERONAUTIC CONVENTION, EXHIBITION AND CONTESTS

SATURDAY, MAY 17TH

AFTERNOON—Aerial races and contests. Illustrated addresses on Aerial Photography.
EVENING—Ball.

SUNDAY, MAY 18TH

AFTERNOON AND EVENING—Illustrated addresses on "Aerial Exploration and the Use of Aircraft for Coast and Geodetic Survey."

MONDAY, MAY 19TH

AFTERNOON—Addresses on "Need of Broader Attitude Regarding Insurance for Aircraft and Aviators."
EVENING—Illustrated address on "How Army Medical Standards and Inspection Lessen Accidents." Insurance companies and agents invited.

TUESDAY, MAY 20TH

AFTERNOON AND EVENING—Illustrated addresses showing different ways of crossing Atlantic by air and the problems to be solved to accomplish same successfully.

WEDNESDAY, MAY 21ST

AFTERNOON—Aero Safety Day. Discussion of aero safety provisions made; improvements in aeroplane construction; increased reliability of aero motors; devices which make for safety in flying.
EVENING—"Progress Made in the Art of Piloting Aeroplanes." Illustrated.

THURSDAY, MAY 22ND

AFTERNOON AND EVENING—Addresses and discussions of meteorology—"How the Weather Forecasts Can Be Extended and Made More Efficient by the Use of Aircraft in Exploring the Upper Air," also "How the Weather Forecasts Help Aerial Navigation," and "Topographic and Climatic Factors in Relation to Aeronautics."

FRIDAY, MAY 23RD

AFTERNOON AND EVENING—Addresses on "Aerial Jurisprudence—Aerial Laws and Regulations of Air Traffic." (First day). Lawyers, traffic commissioners and police authorities of different countries invited.

SATURDAY, MAY 24TH

AFTERNOON—Races and contests.
EVENING—Illustrated address on "Need of Establishing Altitude Levels for International, Interstate and Interurban Air Travel."

SUNDAY, MAY 25TH

EVENING—Aeronautic Art Day. Address on "Aerial Painting and Sculpture of Different Countries, and Exhibition of Aerial Paintings," by Lieut. Farre, Lieut. Ruttan and others. All prominent artists, managers of art galleries and art patrons invited to attend.

ENGINEERING WEEK

MONDAY, MAY 26TH

EVENING—"Aeronautic Engineering Problems and Their Prospective Solution." Opening of contests for designs and ideas for large aeroplanes.

TUESDAY, MAY 27TH

EVENING—"Factors That Increase the Efficiency for Large Dirigibles." "Advantages of Veneer and Plywood for Aircraft Construction."

WEDNESDAY, MAY 28TH

AFTERNOON—Address on "Problems of Flying at 35,000 Feet and Over, and Their Prospective Solution."
EVENING—"Present Day Aero Engines."

THURSDAY, MAY 29TH

AFTERNOON—"Flying Boats Versus Hydroaeroplanes for Sport and Transportation."
EVENING—Contest for designs and ideas for large aeroplanes.

FRIDAY, MAY 30TH (Memorial Day)

AFTERNOON—Aircraft contests.
EVENING—Reception at the Aeronautic Hall, Steel Pier.

SATURDAY, MAY 31ST

AFTERNOON—Aircraft contests.
EVENING—"International Medical Standards for Aviators in War and Peace." Reports from different countries illustrated with attractive films. 50,000 medical men invited.

SUNDAY, JUNE 1ST

AFTERNOON AND EVENING—Award of prizes and diplomas for all events.



The News of the Week



Martin Bomber Covers 650 Miles In 7 Hours 55 Minutes

Washington, D. C., May 8.—A Martin bombing plane carrying four passengers completed a round trip flight from Macon, Ga., to Washington, D. C., and return with a non-stop flight from Washington to Macon. The distance of 650 miles was accomplished in seven hours and fifty-five minutes.

The passengers were: Lieut. Colonel T. E. Gillmore, of the Royal Air Force, Major W. H. Frank of the U. S. Air Service, Captain Roy N. Francis, Pilot, and Lieut. E. E. Harmon, second Pilot. The party left Bolling Field, Washington, D. C., for Macon, Ga., Sunday, May 4th. at 1:25 P.M. and arrived at Pinehurst, S. C., at 6:05 Sunday evening, stopping there over night.

From the Peace Treaty

The importance which is now attached to aerial transportation rights and aerial equipment in the enemy country may be realized by the extracts from the Peace Treaty on the air and aerial navigation:

"The armed forces of Germany must not include any military or naval air forces except for not over one hundred unarmed seaplanes to be retained till October 1, to search for submarine mines. No dirigible shall be kept. The entire air personnel is to be demobilized within two months, except for 1,000 officers and men retained till October. No aviation grounds or dirigible sheds are to be allowed within 150 kilometers of the Rhine or the eastern or southern frontiers, existing installations within these limits to be destroyed. The manufacture of aircraft and parts of aircraft is forbidden for six months. All military and naval aeronautical material under a most exhaustive definition must be surrendered within three months, except for the 100 seaplanes already specified.

"Aircraft of the Allied and Associated Powers shall have full liberty of passage and landing over and in Germany territory, equal treatment with German planes as to use of German airdromes, and with most favored nation planes as to internal commercial traffic in Germany. Germany agrees to accept Allied certificates of nationality, airworthiness or competency or license and to apply the convention relative to aerial navigation concluded between the Allied and Associated powers to her own aircraft over her own territory. These rules apply until 1923 unless Germany has since been admitted to the League of Nations or to the above convention."



Roy Knabenshue, W. E. Duersten and Col. W. N. Hensley, Jr., at Wingfoot Lake, Akron, Ohio, with the first army dirigible in the background

Aerial Sightseeing Service for Yellowstone Park

The Grand Canyon, Yosemite Valley, Yellowstone National Park, and the Little Zion Canyon will all be linked in a day's tour by the new airship sightseeing trip, that will be in operation this summer in the intermountain States of the Rockies. Lieut. George C. Beck, chief engineer of the new Utah Motor Corporation, is in New York contracting for the purchase of passenger carrying aeroplanes to be delivered by July 4.

Five Curtiss biplanes from Canada will reach the Utah Company's field at Salt Lake City this week, and exhibition flights will be made there Memorial Day.

The new corporation is capitalized at $2,500,000. L. J. Gilmer, a prominent Western automobile manufacturer, and J. C. Kinney, multi-millionaire oil magnate, control the chief interest in the new company. All the pilots of the ships are ex-army fliers.

Details of the Transcontinental Flight

Some interesting facts are coming out regarding Major Tom C. Macaulay's remarkable aeroplane flight in doubling the continent—San Diego to Jacksonville—Jacksonville to San Diego—although the Major's route was first to the west, Fort Worth to San Diego and return, thence east, Fort Worth to Jacksonville and return. The Major's flight was on a course between the 30th and 33rd parallel of latitude. This carried him from California, across Arizona, about one-third of southern New Mexico, across the entire state of Texas from El Paso to Marshall, then Louisiana, Mississippi, Alabama, Georgia and Florida, in all nine states. This was the Major's third continental trip, and the flying was done between April 12th and 18th. The total distance, coast to coast and return, was 4,642 miles—flying time 4¼ hours and 15 minutes.

The eastern flight, on account of favorable air currents was accomplished in 19 hours, 15 minutes.

The aeroplane used was a De Havilland Four equipped with Liberty Motors, and carried 60 extra gallons of gasoline and 10 extra gallons lubricating oil. The flight west across Texas was at an elevation under 1,000 feet, and guided wholly by the compass. The trip over the Coast Range Mountains at an elevation of 8,500 feet was uneventful, and San Diego reached without incident. Eastward over the snow-covered coast range an eleva-



Curtiss Flying Boat over the German submarine in the Hudson River during the Victory Loan Drive

tion of 11,000 feet was attained for the purpose of taking advantage of strong westerly currents. East of Fort Worth conditions were good at 6,000 feet into Souther Field, Georgia, and at 3,000 to Jacksonville, Florida; the return to Fort Worth was without incident. The summary distance and time was as follows:

	Miles	Time Hrs.	Mins.
Ft. Worth to El Paso...	580	7	15
El Paso to San Diego...	704	7	20
San Diego to Ft. Worth.	1284	10	10
Ft.Worth to Souther Field	852	6	55
Souther Field to Jacksonville and return to Jackson, Miss.....	812	8	5
Jackson, Miss., to Ft. Worth	410	4	30
Total	4642	44	15

The Pan-American Commercial Conference, June 2 to 5, 1919

The governing board of the Pan-American Union, Washington, D. C., having in mind the great present interest in Pan-American trade, believe that much good should result to governments, organizations, firms, and individuals from an informal but comprehensive exchange of views and information between the official and unofficial representatives and experts and others interested in the commercial development of both North and South America.

Among those invited to attend and participate will be the diplomatic, consular and special commercial and financial representatives in the United States of Latin American governments, representatives of Latin American firms and houses, and such unofficial experts as are able to attend, officials of the United States Government having to do with Pan-American economic, financial and commercial relations, as well as commercial and trade organizations, firms and houses which are directly interested in Pan-American trade.

The great interest which the Second Pan-American Aeronautical Exhibition, Convention and Race Meet at Atlantic City has aroused with the representatives of the Latin American Republics makes this commercial conference a particularly appropriate place to build up the rapidly growing trade importance of aeronautical equipment and supplies. The market for aircraft in South and Central America is a very broad one, and it is felt that the aircraft manufacturers will lose no opportunities to gather information and to cement trade relations which will prove of paramount importance.

Dirigible C-5 to Attempt Rockaway-Newfoundland Flight

St. John's, N. F., May 10.—The United States Navy dirigible C-5, now at Montauk Point, N. Y., will make a test flight to Newfoundland within a few days, according to officers of the cruiser *Chicago*, which arrived here from New York, flying the flag of Rear Admiral Spencer S. Wood.

The *Chicago* came here under special orders in connection with the dirigible flight, and brought a quantity of equipment, including containers of hydrogen gas. It is understood the flight will be undertaken immediately after the naval flying boats have cleared these waters. It has been decided to hold the trial at this time in order to utilize as a patrol the naval ships on duty for the seaplanes.

Two More British Competitors

Captain John Alcock and a party of aviators and mechanics have arrived at Halifax on the Mauretania to prepare for an attempt to fly across the Atlantic in a Vickers Vimy machine. Another candidate for the great international ocean-crossing contest by air is Col. John Cyril Porte's immense flying boat, which is entered for the *London Daily Mail's* $50,000 prize.

This giant plane, named the Felixstowe Fury, is a Handley Page, built from Col. Porte's own designs.

An Addition to the Sopwith Trans-Atlantic Equipment

A new device—a throat transmitting telephone—has been added by Hawker to the equipment of his trans-Atlantic plane. This telephone makes conversation between pilot and navigator easy despite the roar of the motor. The principle is the transmission of the vibrations of the throat by means of a band about it and the shutting out of the engine noises by permitting the roar to beat with equal force on both sides of the transmitting diaphragm. It is similar to that used by the American tank soldiers during the war.



Chilian delegates to the Second Pan-American Aeronautic Convention. Left to right: Capt. Garfias, General Pinto, Chief of Staff of the Chilian Army; Capt. M. G. Cleary and Colonel Ewing, Military Attaché to the United States from Chile

Three Navy Seaplanes Made Seven Hundred Mile Non-Stop During War

Washington, D. C.—Owing to strict military censorship, it was not announced until recently that on Nov. 7, 1918, three navy planes H. S. flying boats left Bay Shore, L. I., for Brunswick, Ga., a distance of approximately 700 miles. The squadron was under the command of Lieut. Harold F. Selden. These three planes arrived in Brunswick twenty hours later, after stopping for fuel at Cape May, N. J.; Hampton Roads, Va.; Moorehead City, N. C., and Charleston, S. C. The boats were flown by the following officers: Ensigns Paul Storrer, Taylor, Titts and Shanks. This flight was so successful that a second flight was made the following week, three other planes leaving Bay Shore for Brunswick. Two of them arrived as successfully as the first three, but one was wrecked on the coast of North Carolina.

The Cleveland Aviation Club

Since the organization of the Cleveland Aviation Club in April, this enterprising body of one hundred and thirty members has obtained five Government planes for flight for the Victory Loan, and is working hard to persuade the city to furnish a municipal landing field. Besides entertaining Capt. Eddie Rickenbacker at their inaugural banquet at the Hollenden Hotel, they have appointed committees to entertain the U. S. Government circus flyers, and to act as hosts for all flyers who may visit Cleveland

Board on Aeronautical Cognizance Warns Against Flying Without License

The Joint Army and Navy Board on Aeronautical Cognizance has found it necessary to issue a warning on recent indiscriminate operation of aircraft and the serious dangers entailed in the operation of aircraft by inexperienced fliers. The warning was the result of a flight over New York during the parade of the 27th Division in a flying boat at low altitudes.

The board points out that there is no way of adequately providing for the public safety where aeroplanes fly at too low an altitude over cities or large assemblies of persons. In case of accident a pilot would be forced to descend immediately, and human life and property would be endangered to a serious degree. All persons operating civilian aircraft are cautioned against the repetition of an occurrence such as that at New York, and are warned that before engaging in the operation of any aeroplane or balloon they must first secure a license from the Joint Army and Navy Board of Aeronautic Cognizance.

Aviation on the Western Coast

Aviation in California is exceedingly active, and among the interesting demonstrations is a remarkable Sierra Nevada and Rocky Mountain flight, as well as a flight in two Curtiss planes, piloted by Lt. T. S. Curtis and Lt. Wm. Beck, to Ogden, Utah, from Mather Field. The course, which has never before been attempted by aeroplane, covers a distance of over 700 miles. At Mather Field special acrobatic demonstrations have been made for the benefit of some twenty-five thousand spectators, and owing to the superb weather conditions flights have been made to Berkeley, San Jose, Santa Cruz, Salinos, Hollister, Oreville, etc.

GLENN H. CURTISS ON THE TRANS-ATLANTIC FLIGHT

THE American N-C Planes will gain nine (9) hours from favorable winds if the average weather conditions for May prevail during the coming week. Such is the statement of Glenn H. Curtiss, inventor of the flying boat, and joint designer and producer with the U. S. Navy, of the Navy-Curtiss flying boats which are now at Newfoundland ready for the trans-Atlantic take-off.

"The conditions governing the trans-oceanic flight," said Mr. Curtiss, "are partly created by the weather and the route chosen, and partly by the flying craft themselves. The Navy has obviously given a long and careful study to both. In my opinion Naval flyers have chosen the best route and are employing a type of seaplane which gives them the largest possible factor of safety.

Advantages of the Azores Route

"There has been a difference of opinion as to whether the Newfoundland-Ireland or the Newfoundland-Azores-Portugal route is the better. The former is more direct. As one who has been interested in trans-Atlantic flight since 1914, however, I can see five distinct advantages to the southern course. They may be listed as follows:

1. It requires a maximum flight withiut landing of almost seven hundred miles less than does the northern route. The distance to Flores, the first Azores Island, is only 1200 nautical miles as against 1890 to the Scilly Islands, the nearest point off the Irish coast.
2. It avoids the dangerous fog belt which lies to the east and northeast of Newfoundland.
3. It is attended by more favorable weather generally,—warmer, clearer, and freer from atmospheric disturbances.
4. It is in the path of steamer traffic, and hence offers a greater element of safety in case it is necessary to make a descent in mid-ocean.
5. It is in the path of winds which, under normal circumstances, will increase by 40% the speed of the aeroplanes.

"The N-C planes could doubtless have gone by the northern route. It is shorter than the southern. If the trans-Atlantic voyage were to be admitted a hazard, better indeed to get it over with in the quickest possible time, like a cold shower. But the Navy, I believe, wishes to prove that for the right type of plane the Atlantic trip is not a hazard. The present flight is to be the demonstration of how others like it can be made regularly."

The Problem of Weather

Mr. Curtiss then discussed the question of wind and other atmospheric elements. The weather conditions for any part of the ocean during a given month are, he pointed out, in the large constant. Over the water lying between Trepassey Bay and the Azores the average winds blow from the northwest. This produces an exceptionally favorable condition, as the flying boats will be blown away from the fog belt (once they are through a small wind zone just off Cape Race) and almost directly toward the Azores. The velocity of these winds, rising so far as can be computed, to 30 miles per hour at 1500 feet elevation, is such that a course plotted to take full advantage of them will bring the aircraft to the Azores in about twenty hours, while if there were dead air the trip would take thirty.

Whether average weather conditions will prevail is a question. British flyers at St. Johns have been waiting over a month for the usual easterly winds, which they expected to find. It is not probable that the Navy boats will wait for ideal conditions, even though ideal conditions may be said to be the norm. They will be satisfied with conditions not distinctly unfavorbale.

Other Factors Governing Speed

"But wind," said the flying boat designer, "is not the only matter to be considered. It will be interesting to many to know that the speed at which an aeroplane flies is determined by a number of considerations. The N-C boats will not fly as fast as they can, for to fly at top speed would not be economical under the circumstances. Top speed uses up more fuel in proportion to distance covered than certain lower speeds, and in a trip like this gasoline and oil must be carefully conserved. In other words, an economy of energy is necessary for the purpose in view. The flying boats are in a sense like a runner. To start for the Azores at top speed would be somewhat like beginning a mile run with a 100 yard dash. They might draw on their fuel supply to a dangerous point. In any trip, therefore, where a saving of gasoline is desired, the motor is run at what is called *the economic speed.* This is the speed at which the greatest ratio of miles per hour to gasoline consumed may be obtained.

For instance, going at 75 miles an hour might demand a larger consumption of gas in proportion to speed than going at 70 miles an hour.

But the economic speed also varies with the amount of load carried. For instance, at the beginning of the present trip a speed of 71 miles an hour (regardless of wind) ought to be most efficient. This speed is higher than it would be if 28,500 lbs. did not have to be supported. Consequently as this weight is reduced by the consumption of oil and gas the economic speed lessens, less power being required to support less weight, and less power resulting in slower forward progress.

Thus if a flight of 30 hours were to be made, the economic speed would have decreased at the end of the voyage from 71 to 61 miles per hour. This would have followed a decrease in load of 11,000 lbs., the consumption for that period of oil and gasoline. The reduction would have been marked by the shutting off of one of the three motors with which the flying boat had been propelled after its take-off, it being possible to support the aeroplane with two motors after about 6,500 lbs. of gasoline and oil had been consumed, leaving a reserve of two motors during the remainder of the trip.

Prediction Possible Under Certain Conditions

If the speed of the flying boat were determined by wings and motor alone, we could thus estimate scientifically, knowing the load of 28,500 lbs., the position of our aircraft at any stage of the journey. Since the weather is an additional factor, however, we can only guess. With average wind velocity and direction, it should take just 21 hours for the N-C's to reach San Miguel, the Azores island at which they plan to stop unless it is advisable to descend at Flores.

If normal wind conditions should prevail, the boats would have, at the beginning, a flight for three hours against a cross wind. They would fly at 71 miles per hour in order to sustain their load of 28,500 lbs., and would gain from the

(*Continued on page* 510)



The Trans-Atlantic Boat N.C.-3, equipped with four Liberty motors, and with three tractor propellers and one pusher. © Central News

THE START OF THE TRANS-ATLANTIC FLIGHT

By G. DOUGLAS WARDROP

THE navy fliers have made a gallant and successful start. The longest, most difficult, and most dangerous part of their journey still lies ahead, and they may yet find some obstacle in weather conditions such as have held the British fliers so long at St. John's. But all praise to them for their good beginning.

The three United States Navy flying boats NC-1, NC-3, and NC-4, got away from Rockaway at 10 o'clock on the morning of May 8th. After several days of waiting, commanders and crews were on edge when gray dawn stole in this morning and were early down at the launching ways of the three big flying boats. Before 8 o'clock the "One" and the "Three" were taken out for test flights, and were found fit in every minutest particular. Victualled, fuel tanks filled, tuned up to the last minute, they were ready to go.

The only thing holding back the start was uncertainty as to the weather along the coast to the north. At Rockaway weather conditions were ideal for flying, with a gentle, steady wind out of the northwest which would put it almost at the fliers' backs. And as reports came in from northern points, showing the weather equally favorable all along the route, the impatience of men and commanders to be off became more and more marked.

At length the full weather report from Washington arrived at 9.30 A. M., and Commander Towers, standing among a group of officers, grinned broadly and cried:

"Well, boys, we beat it!"

The ensuing half hour was a busy time, with none except those officially attached to the navy permitted near the marine railways or launching ways which held the three big seaplanes. The watching crowd was small, however, consisting of some 500 to 600 attaches of the naval air station and of newspaper men. To this number was added presently a group of women, including the wives of Commander Towers and his brother officers.

Captain Noble E. Irwin, U. S. N., chief of the Bureau of Naval Aviation, Washington, escorted the women to the station and on arrival excused himself to run forward to the launching ways, waving some small object in his upraised hand. He was laughing as he greeted the first man, extending the object to him.

"A four-leafed clover," said the man. It was Lieutenant-Commander Richardson. "Gee!"

And he crammed it deep into a well-protected pocket.

Captain Irwin, a "four-striper," hustled along the launching ways, dealing out other four-leafed clovers from his pocket to officers and mechanics of the boat crews alike. Each man receiving his smiled beatificially, as if certain that now all would be well, and immediately stowed that clover away at the bottom of everything.

"Hey, Captain," a voice called out, as Captain Irwin was about to turn away, "don't forget 'Smoke'!"

The captain faced about and at the sound of his name being shouted, "Smoke" Rhodes, mechanic of the NC-4, looked up from his occupation of tinkering with something in the cockpit of the big boat, and peered over the edge, fifteen feet above Captain Irwin's head. With a wave of the hand, the captain started to provide a reserve personnel in to climb up and "Smoke" stretched a greasy hand down to meet him. He took the extended clover, and then the captain gripped his hand, grease and all, and shook it heartily.

At this sign of comradeship between "four striper" and mechanic, the sailors ashore let out a cheer.

And now the hour to start had come. The three boats were poised on the launching ways, bodies of battleship gray, wings yellow. Every man was in his place. Each boat held its crew of six, with an additional man to be carried as far as Newfoundland in order that minor mechanical difficulties which might occur in the first part of the trip could be quickly remedied, and also in case of any sickness developing among the regular crews.

The men obviously were laboring under great nervous excitement as they settled in their places, adjusting over their heads the instruments of the wireless telephone with which they could communicate with each other. The pilots gripped the wheels. The crowd stood clear.

With a tremendous roar, the four big Liberty motors of the NC-3, Commander Towers' craft, began turning over. The boat leaped down the launching way like a thing alive and slid far out into the water. It was 9.57.

Another roar, the NC-4 was on her way, 9.58.

Another roar, the NC-1 was off, 9.59.

For a few breathless minutes the boats manœuvred in the water. Then the "Three" suddenly soared upward. One minute later to the second the "Four" followed in the air. And another precise minute behind rose the "One."

There was little cheering. Everybody was too busy watching and thinking of what the start of the flight portended, perhaps, to give vent to his feelings.

Long before the flight was determined upon, the few spectators were assembled. Besides Commander Irwin, Commander A. K. Atkins, head of the aviation sec-

American and British Planes Ready for Ocean Flight

St. John's, N. F., May 14.—The American NC-1 and NC-3 planes are ready to attempt the ttransatlantic flight as soon as the storm area over the mid-Atlantic disappears. The NC-4 is expected daily from Chatham, Mass., where she was forced to descend on account of engine trouble encountered on the first leg of the flight from Rockaway Naval Air Station. Unfavorable weather conditions have prevented the NC-4 from rejoining the NC-1 and NC-3 at Trepassey Bay.

According to press dispatches, it is considered likely that the NC-4 will attempt to fly to Trepassey Bay from Chatham in one flight. It is considered improbable that the NC-1 and NC-3 will wait for the NC-4, and hence every effort is being strained to reach Newfoundland before the start of the remainder of the fleet.

Two aviation parties contemplating a transatlantic flight in Bolton and Paul and Vickers-Vimy aeroplanes, both of British make reached here on May 13. While Messrs. Hawker and Raynham, pioneer flyers at this "hopping off" place, studied weather charts which indicated continuance of unfavorable conditions which have held them landbound for more than a month. Captain U. S. Bennett began an inspection of a possible site for the Bolton and Paul three seater, while Captain A. A. Alicott and A. W. Brown conducted negotiations for the housing of their Vimy machine.



The NC-1, first of the NC flying boats built for the Navy's attempt to fly across the Atlantic

tion of the Bureau of Steam Engineering, which is responsible for the power plants of the planes, also came on from Washington.

Glenn H. Curtiss, builder of the planes; Commander G. C. Westervelt, who had much to do with the construction of the hulls of the ships; G. Douglas Wardrop, managing editor of AERIAL AGE; Mrs. Richardson, wife of Commander H. C. Richardson, pilot on the NC-3, and her little daughter Margaret Jane; Mrs. Ida Harding, aunt of Lieut. Barin, pilot on the NC-1, and Lieut. Commander George R. Murray, commandant of the naval aviation station at Anacosta, D. C.; Dr. Charles Olmstead, designer of the propellers used by the seaplanes, and Herbert Satterlee, formerly Assistant Secretary of the Navy, and Mrs. Satterlee, also were present.

When the planes leave for the Azores, 1,200 nautical miles distant from the starting point at Trepassey Bay, Newfoundland, they each will weigh 28,000 pounds, for they will carry two tons more of gasoline than they did on their first hop. In addition, instead of seven men the flagship of Commander Towers will carry only five, who, besides the commander, will be Commander Richardson and Lieut. David H. McCullough, pilots; Lieutenant-Commander R. A. Lavender, radio operator, and Machinist L. R. Moore. Lieutenant-Commander R. E. Byrd, who was on board yesterday to conduct special navigational experiments, and Lieut. B. Rhodes, reserve pilot engineer, will be dropped at Newfoundland.

Lieut. J. L. Breese will quit the crew of the NC-4 at Newfoundland, leaving it composed of Lieutenant-Commander A. C. Read, commander and navigator; Lieuts. E. F. Stone and Walter Hinton, pilots; Ensign H. C. Rodd, radio operator, and Chief Machinist's Mate E. S. Rhodes.

From the crew of the NC-1 Machinist R. Christensen will be eliminated, leaving Lieutenant-Commander Bellinger, navigator; Lieutenant-Commander M. A. Mitscher and Lieut. L. T. Barin, pilots; Lieut. H. Sadenwater, radio operator, and Chief Machinist's Mate C. I. Keslef, engineer, to make the next leg in the journey.

The Personnel of the Expedition

Commander John Henry Towers is in command of the division of three NC flying boats. He was one of the first to go into aviation, at a time when the officers of the navy thought a man was ruining his career to take up with what many thought was only a dangerous toy, and his record covers the whole period of the development of aviation in the navy. A happening in his early career is told as characteristic of the man. In 1910, just after he had become a student in aviation, he and Ensign Billingsly were up in the air 1,500 feet, in a machine of the primitive type of those days, with a bamboo frame. An accident happened, control was lost, and the machine swung over with such velocity that both men were thrown from their seats. Billingsly was flung clear of the seaplane and fell to his death. Towers managed to catch hold of a strut and held to this in the descent toward the water. Just before the machine reached the water, the wind caught it and it leveled off. This broke the fall and saved Towers's life.

In the course of the next year the navy made a definite start in the development of aviation. Towers was ordered to Hammondsport, N. Y., where arrangements had been made with Glenn H. Curtiss to build two flying boats and instruct two officers in flying. Lieutenant Towers, with Lieutenants John Rodgers and T. G. Ellyson, also pioneers, were soon ordered to Annapolis, where three small hangars had been built. The equipment (it sounds like 100 years ago compared with what the navy has today) consisted of one seaplane, one Curtiss landplane, and a Wright. There they continued to fly until January, 1912, when Towers was ordered to the San Diego experimental camp. Next year he was at Annapolis as the senior officer for the training of officers in flying. In the Fall of the year he made a new world's record for sustained flight in the air—six hours and eleven minutes. In 1913 he was ordered to Guantanamo, Cuba, to educate the fleet at that naval base in the possibilities of aircraft. All the time he was engaged in development work, and was one of the originators of the catapult and cable for launching a seaplane from the deck of a battleship.

When the trouble with Mexico arose he was placed in command of the aviation naval detachment in the expedition against Vera Cruz. On his return to Washington he was ordered to special duty to assist in the development and building of a seaplane to cross the Atlantic. At the start of the war he was ordered to Europe, on his own application, as an observer of aviation development there. He visited all the principal air stations, and, while making studies in England, served as Assistant Naval Attache to the American Embassy. In October, 1916, he was assigned to duty in the Office of Operations, Navy Department, where he was the only aviation officer up to the time we entered the war. Later, as a Lieutenant-Commander, he was made Senior Assistant to the Director of Naval Aviation. He received his appointment as Commander in July, 1918. In February of the present year he was placed in charge of the development of plans and the assembly of material for the proposed transatlantic flight. In the order of the latter part of April placing him in command of the transatlanic flight is the following:

"As commander of NC seaplanes Division 1, of regularly commissioned seaplanes, his status will be the same as of seagoing ships of the navy."

Commander Towers is a Georgian, 34 years old. He was graduated from the Naval Academy in 1906. He is married and has a daughter.

With Towers on NC-3

In describing the personnel of each of the seaplane crews separately the strength of the navy's position in attempting the transatlantic flight is brought out. Each commander is a line officer of the navy, and an expert in navigation. Then there are representatives of the Bureau of Construction and Repair, officers who bore an important part in the design of the NC seaplanes, and who therefore know well every part of the construction in case of any trouble. Then there are the representatives of the Bureau of Steam Engineering, with expert knowledge of any problem that will arise in that field; radio men whose inventive ability has added improvements to the apparatus in use, and mechanicians with rare skill for detecting engine trouble. In addition there are overlapping qualifications that bind the crews together. With the exception of the radio men all are pilots. Only the navy, it is evident, could have drawn all these varied experts from one organization.

On Seaplane No. 3, with Commander Towers, the construction end is represented by Commander Holden C. Richardson. He had a large share, it is understood, in the design of the hull of the NC planes. He has been an aviation pilot for many years, and was one of the men who, with Towers, developed the catapult for launching a seaplane from a battleship. He is a Pennsylvanian, born in 1878, and entered the Naval Academy in 1897. Graduating high in his class, he was assigned to construction. His first important connection with aviation came in 1912, when he was ordered to the navy yard at Washington for experimental work on naval hydroplanes. He became one of the first aeronautical engineers in the country, and for the last six years, with some interruptions, has been engaged in the design and construction of seaplanes. While at the Pensacola Station he was one of the first officers to risk his life in a seaplane driven for the first time by a Liberty motor. He is 41 years old.

Lieut. Commander Robert Lavender, the next member of the crew of No. 3, is the radio officer of that ship. He has played a leading part both in the early experimental work in radio telegraphy and telephoning and in their development. He is the officer who gave Secretary Daniels a new experience a short time ago—a talk from Washington wih an aeroplane miles away. Lavender was at the air end. Lieut. Commander Lavender was with Admiral Sims when he was in command of the destroyer force a few years ago. He went up at Guantanamo to test a radio telegraph set, then in its earliest stages. Lieut. Commander Chevalier was the pilot. The machine fell. Lavender sought to stay himself by catching hold of the sides of the boat, and when the plane struck the water both his arms were broken. Chevalier was asked afterward to tell how the fall felt when they struck the water.

"As if you ran into a stone wall when going at the rate of 200 miles an hour," he said.

The experience merely called forth a larger supply of grit in Lavender, though it took a year for him to recover from the effects of the accident. He was assigned to shore duty and placed in charge of all radio material for aircraft work and went to England, France, and Italy to inspect radio air plants there. Laterf, under his supervision, the radio telephone for speaking to and from aeroplanes was developed for long distances. He was born in Iowa in 1889, and appointed midshipman from that State in 1912.

Lieut. Commander Richard C. Byrd, navigator, appointed to the Naval Academy from Virginia in 1908, is a retired naval officer who on his return to active duty in 1917 entered the aviation branch. After completing his course he was ordered to Halifax, Nova Scotia, and placed in command of the United States naval forces operating in Canadian waters. There he made a reputation in the building up of our two stations, one at Halifax and the other at North Sidney, and it is evident that his quick grasp of aviation in view of the short time he has been in the service won him a place in the roster of the transatlantic crews. He is 31 years old

Lieutenant David H. McCulloch, pilot and experimenter in No. 3, member of the United States Naval Reserve force, has been flying many years and is known as one of the best pilots which the war brought to the service of the navy. In August, 1918, he flew from Garden City, L. I., to Hampton Roads, and was one of the first men to go up in the navy's big seaplane. At Hampton Roads he trained many navy aviators for overseas service. He was born in Port



The NC-4, which was delayed at Chatham, Mass., owing to motor trouble experienced in the first leg of the trans-Atlantic flight

Royal, Penn., in 1890, and entered the Naval Reserves in October, 1917. McCulloch is known for his daring. In laying out new types of machines he has been a chief test pilot for the navy during the war.

Next in No. 3 comes Lieutenant Braxton Rhodes, engineer. He is one of the best motor mechanics in America. He knows all the makes of motors like a book, and after several years' service in the navy his skill, steadiness, and nerve led to his alvancement from the ranks. In October, 1917, he was made an ensign in the United States Naval Reserve force. For a short time he was on the other side during the war, at the United States Naval Air Station at St. Trojan, France, in connection with the engineering of various types of motors, and thus not on a duty that barred him from selection for the transatlantic flight. Lieutenant Rhodes was born in Windsor, N. C., in 1892.

Boatswain Lloyd R. Moore is the last man in No. 3 seaplans. His genius as a motor mechanic raised him from the level of an enlisted man. A navy aviation officer said the other day aa Washington that Rhodes and Moore were undoubtedly two of the best motor enginemen in the world.

Moore was born in Grand Island, Neb., in 1892 and won his appointment as boatswain in May, 1918.

Fliers on NC-1

Lieut. Commander Patrick N. L. Bellinger, comander of the NC-1, like Towers, goes back to the very beginning of aviation in the navy. He was our fourth naval officer to qualify as an aviator. Before that he had specialized in gunnery. In 1910 he commanded the turret that made a new high record. Then his daring nature sought opportunity with the submarines, and during 1912 he was attached to the Atlantic Submarine Flotilla. In the following year the risks and promise in aviation appealed to him, and he was ordered to the Naval Academy, and he has been prominently identified with the development of aviation ever since. In 1914 he was sent to Guantanamo, Cuba, where an aviation camp was to be established for the Atlantic Fleet; then to the North Carolina to assist in the experiments for the launching of a seaplane from the deck of the ships by means of the catapult.

In the Winter of 1915 he took part in one of the first instances in which gunnery fire from a ship was spotted by means of an airplane. With Lieut. Commander Read as the observer, he flew over from the naval air station at Pensacola to the fleet, and spotted for the New York and Texas in firing at special emplacements at Fort Morgan, Mobile Bay. In 1916 the Lieutenant Commander had charge of the experiment and test department at the Pensacola Station, which included the trying out of all new machines. The next year, in November, he was placed in command of the naval air station at Hampton Roads, where he did important experimental work, besides serving on boards in connection with the location of new United States stations along the Atlantic Coast in the United States and Canada. Next to Lieut. Commander Chevalier, Mr. Bellinger has probably spent more time in the air than any other officer in the Navy. He is a man of remarkable physique, though of medium height, and will have his joke, even at the most ticklish times. He is a South Carolinian, born at Cheraw in 1885, appointed a midshipman from that Statae in 1903, and is married.

Next in No. 1 is Lieut. Commander Marc A. Mitscher, navigator. He took part in the aviation experiments on the battleship North Carolina, and is a graduate of the Navy aviation class of 1916. In 1918 he was placed in command of the Naval Air Station at Rockaway, L. I., and later was in charge of the Navy Air Station at Miami, Fla., one of the largest elementary training stations in the Navy during the war. His combined record as a pilot and an executive signaled him out for a place in the trans-Atlantic crew. He was born in Wisconsin in 1887, and entered the naval service as a midshipman from Oklahoma in 1904.

Lieutenant Louis T. Barin, pilot and experimenter, United States Naval Reserves, is both a designer and a pilot, with a combination of qualities hard to duplicate. At Pensacola, where he was stationed in 1917 to test out new planes, he acquired the name of "Daredevil Barin." There his nerve had to face a severe ordeal. He was up 6,000 feet with a new machine when it went wrong and, turning over, began to fall. Down it came, apparently a hopeless wreck, but Barin kept his head and worked with might and main to regain control. Within a few hundred feet of the water he succeeded, but his helmet and goggles were gone and his clothes partly torn off him by the air pressure of the descent at such a velocity from a great altitude.

Barin was born in Portland, Ore., in 1890, and entered the Naval Reserve Force in April, 1917.

Lieutenant Harry Sadenwater, radio officer for Seaplane No. 1, has had unusual experience with the direction finder. Before he joined the Naval Reserves in April, 1917, he was radio instructor in in East Side Y. M. C. A., New York City, and was also radio inspector for the Department of Commerce in New York. In this capacity he adjusted the radio apparatus on every ship of importance coming into New York. Lieutenant Sadenwater was born in Brooklyn in 1894.

Machinist Rasmus Christiansen and Chief Machinist's Mate C. I. Kesler, mechanicians for No. 1, are both skilled in the highest degree and proved in previous emergencies. Christiansen was born in Germany in 1883, and is one of the old navy chief petty officers. Kesler entered the navy in 1905. He was born in Ohio in 1882.

On the Seaplane N. C.-4

Seaplane No. 4, the craft which alighted off the New England coast while trying to fly to Halifax on Thursday, is in charge of Commander Albert C. Read. He belongs to the second group, in point of time, in the development of Annapolis graduates in aviation. To the first group belonged Towers, Richardson, and Bellinger. The pioneers became pilots through individual training. Read is a member of the first aviation class of the navy, that of 1914. He had been graduated at the Naval Academy earlier, near the top of his class, and his ability advanced him rapidly in aviation. He not only won a place as one of the best pilots, but also as an administrator in the aviation division.

Commander Read was born in New Hampshire in 1887 and appointed a midshipman from Massachusetts in 1903. He is married and has one child, a boy. He is a small man, quiet and observing.

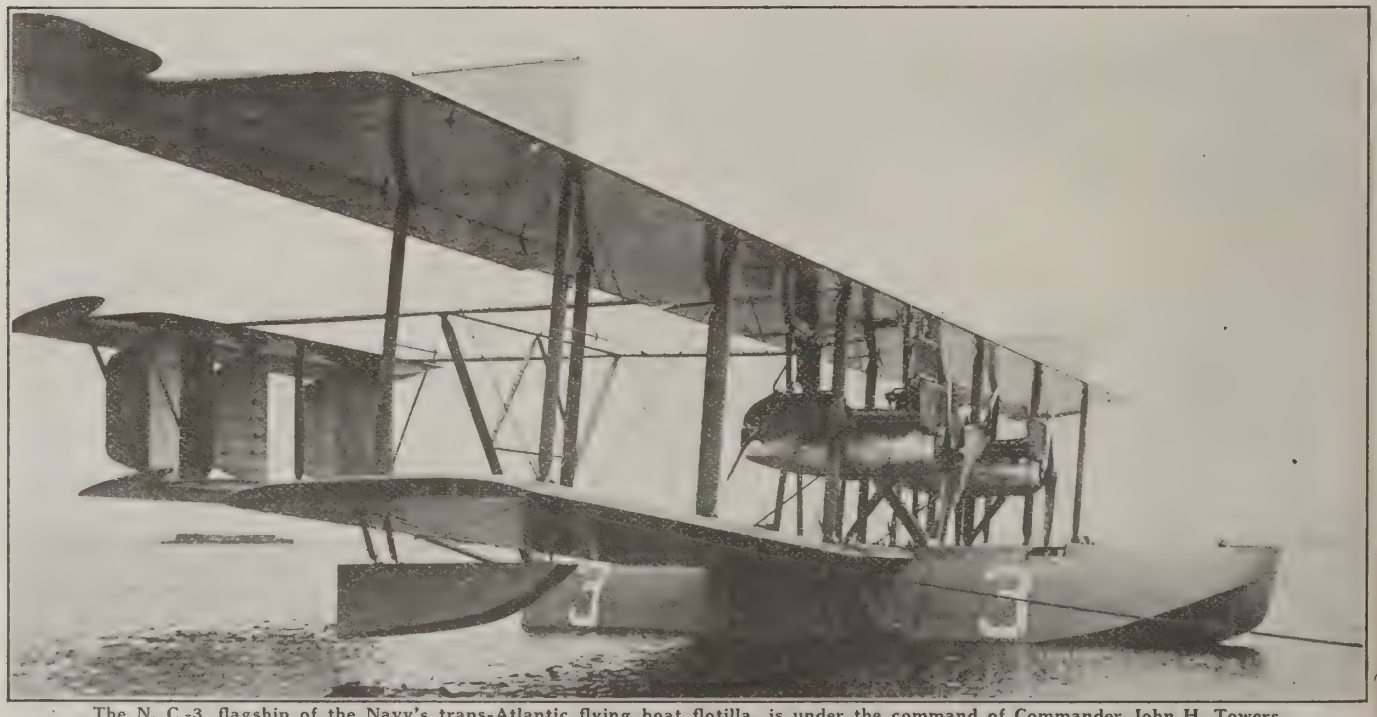
First Lieutenant Elmer F. Stone, pilot and construction, belongs to the United States Coast Guard and is one of the oldest fliers in that organization. His skill and daring when the war placed a greater pressure on the Navy led to his transfer to the Bureau of Construction and Repair as a test pilot for new machines, and the record he made won him a place in the trans-Atlantic list. Lieutenant Stone was born in New York in 1887 and appointed to the United States Coast Guard Academy from Norfolk, Va., from which he was graduated in 1910.

Lieutenant Walter Hinton, pilot, was an enlisted man who became an ensign in March, 1918, and on account of his skill as an aviator was designated as one of the pilots of the flying boat H-16 in its flight from Rockaway Beach to Hampton Roads last January. Hinton was born in Ohio and is 31 years old.

Lieutenant James L. Breeze, engineer, the next man in No. 4, is from the Bureau of Steam Engineering, Navy Department. During the war he served as a test pilot for experimental machines and was also engaged in the development of power plant accessories and apparatus as a member of the Havier-than-Air Engineering Section of the Bureau of Steam Engineering. In January, 1919, he was detailed to the special board, of which Lieut. Commander S. M. Kraus was the senior member, to make a study of equipment and power plant installation of the seaplanes being prepared for the trans-Atlantic flight. This is an illustration of how each member of the crews had previous thorough contact with the problems that would confront him on an ocean flight. Lieutenant Breeze is a member of the Naval Reserves, which he entered as an ensign in November, 1917. He was born at Newport, R. I., and is 34 years old.

Ensign Herbert C. Rodd, radio officer for No. 4, assisted in the development of the radio compass used on the three seaplanes. Before he joined the United States Naval reserves in August, 1918, Ensign Rodd served as radio operator on the Great Lakes. He was born in Cleveland, Ohio, in 1894.

In the original assignment of the crew of No. 4, E. H. Howard, United States Naval Reserve Force, and Eugene S. Rhoades, U. S. N., were the mechanicians of No. 4, Rhoades serving as assistant to Machinist Howard, but the accident by which Howard lost his left hand removed him from the list, and Rhoades was moved up to his place. Rhoades is serving for the second time in the Navy, which he entered as a coal passer, and is known as one of the best enginemen in the Navy. His home is at Somerset, Penn. He is 28 years old.



The N. C.-3, flagship of the Navy's trans-Atlantic flying boat flotilla, is under the command of Commander John H. Towers

FINDING AIRCRAFT LANDING STATIONS BY MEANS OF AUDIO FREQUENCY RECEIVERS

Address Delivered at the Second Pan-American Aeronautic Convention

By EARL C. HANSON

Expert Radio Aide, Bureau of Steam Engineering, Navy Department

ONE of the most important problems confronting the successful future of commercial aerial navigation is the development of a practical means for the landing of aircraft with absolute safety in darkness and the densest fog. The purpose of bringing forth the following plan is to increase the safety in aviation and thus contribute to the advancement of this new art.

At present unless atmospheric conditions permit a clear vision of the field from a considerable distance and altitude, the bringing of aircraft to earth at the spot chosen is uncertain and hazardous. At night, even with the use of powerful searchlights, successful landings are exceedingly difficult. With this in mind we must now seek means of overcoming this difficulty

The Air Depot or landing station proposed is shown diagrammatically in Figures 1, 2, 3 and 4. It comprises broadly the combination of a radio directive transmission system to guide the aircraft at high speed in a direct course between separated cities or other points, audio frequency signal means to project audio frequency energy to predetermined altitudes but restricted to the area of the landing field; and an indirectly illuminated zone in the center of this landing field. The landing station is so equipped that aircraft flying between two ports can follow a direct course by noting the route in which the maximum strength of radio signals are received. If desired, visible electrical indicators actuated by the radio signals may be utilized. The purpose of the audio frequency transmission system is to indicate the exact location of the landing field in such a way that the aircraft in crossing the beam of projected audio frequency energy is not only aware that the field lies directly below but can determine under any condition the approximate altitude.

Before discussing the complete system it would be well to consider the development of the radio compass. Under the direction of Captain S. C. Hooper, U. S. N., head of the Radio Division of the Bureau of Steam Engineering, this new application of radio has progressed far beyond anything realized by the public. Captain Hooper is a firm believer in the radio compass as a means of promoting the safety of sea or aerial navigation. Upon his recommendation the experts of the Naval Radio Laboratory, Bureau of Standards, Washington, took up development in this important field. To-day all ships of substantial size in the Navy are equipped with this marvelous radio compass and shore compass stations are rapidly being constructed at the entrances of our principal harbors from which navigators may obtain bearings, although their ships may be enveloped in heavy fog. We are now ready to consider the application of the radio compass to aerial navigation.



Earl C. Hanson, radio engineer, Bureau of Steam Engineering, who is a pioneer in the development of radio telephone communication for moving trains, and the inventor of a system of wireless audio beacons for aero landing fields

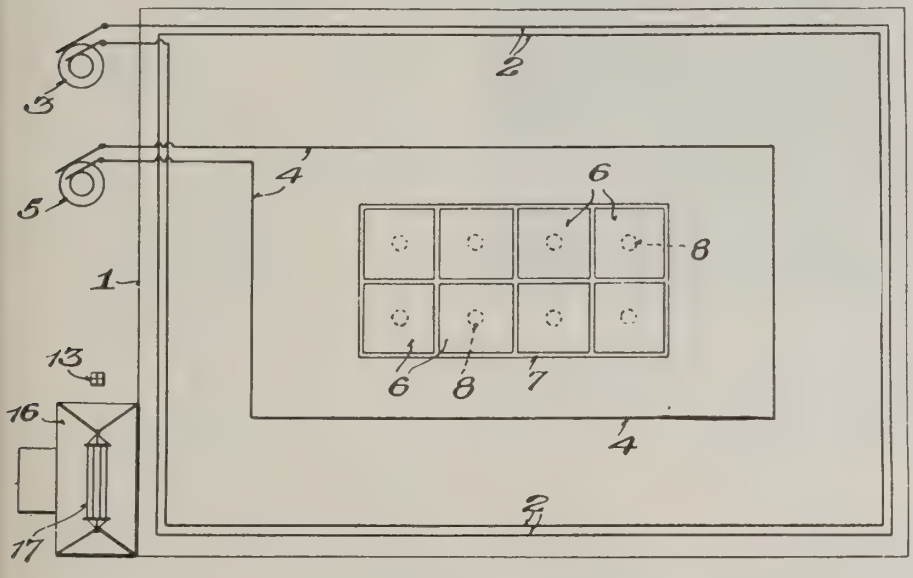
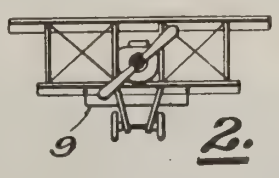
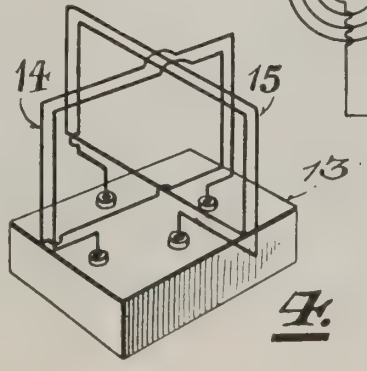


Fig. 1.

The proposed "Air Port" can be more readily understood by reference to the drawings. Referring particularly to Figure 1, the numeral 1 indicates the landing field of the Aircraft Station constructed preferably of solid material accurately leveled and equipped with drainage systems. 2 represents a plurality of insulated electric conductors located at the outer edges of the field and connected to a source of audio frequency current 3. 4 indicates a second loop of insulated electric conductors positioned nearer the center of the landing field and connected to a second audio frequency current source 5. Within loop 4 and at the center of the field is shown an illuminous landing zone. This zone comprises a series of translucent sections 6 supported in a suitable framework 7. The illuminated zone is level with the surface of the field. Beneath sections 6



2.



4.

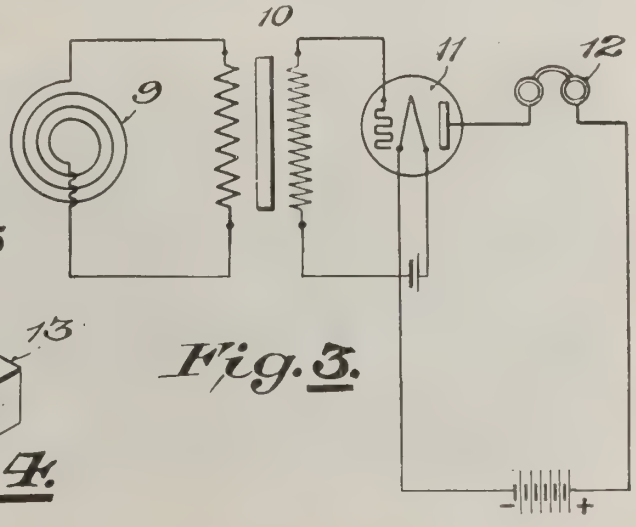


Fig. 3.

there are placed suitable lighting means 8 such that the entire translucent zone is rendered visible at a considerable altitude.

Figure 4 shows the radio compass signalling station represented by numeral 13 in Figure 1. The signalling apparatus is enclosed in casing 13, which may be of the usual form of radio frequency directive transmitting apparatus and is provided with coils 14 and 15 arranged at 90° to each other and positioned in vertical planes. The coils are arranged in predetermined directive lines such that signals transmitted will be propagated in line with the course of the aircraft between communicating stations in separated cities.

Figure 2 indicates an aeroplane provided with a looped conductor 9 connected to audio frequency responsive apparatus contained on the aeroplane. This audio frequency responsive apparatus is of the type using the well-known vacuum tube audio frequency amplifier and is in addition to the radio frequency apparatus The radio frequency apparatus is employed only in guiding the aircraft in their course between the communicating stations.

Figure 3 shows the wiring diagram of one form of audio frequency apparatus adapted to be installed on the aircraft The looped conductor 9 is connected to the terminals of the primary of an iron core transformer 10, the secondary of which is directly connected in circuit with the usual form of thermo-ionic tube amplifier 11 having the customary plate circuit with recording telephone 12. The circuit disclosed permits response to audio frequencies projected upward from the loops 2 and 4 at the landing field.

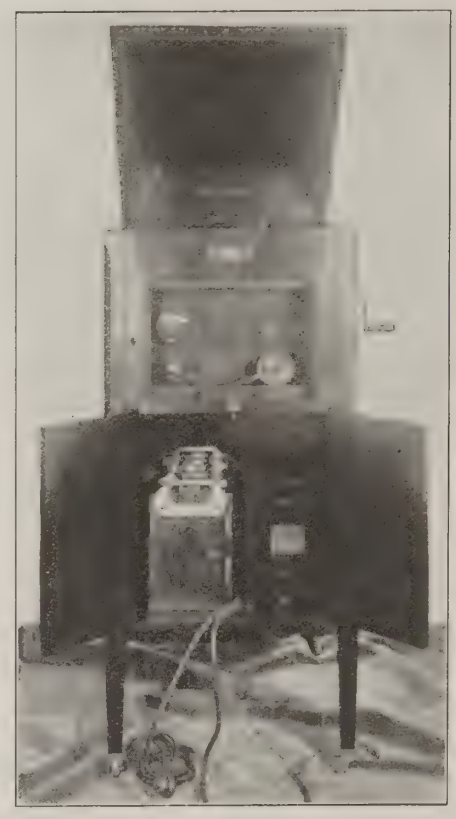
In the operation of the present landing station loops 2 and 4 are supplied with currents of different audio frequencies having different degrees of strength such that electro-magnetic energy will be projected upwards from loop 2 at high frequency and with relatively great strength, while energy projected from loop 4 will have a lower frequency and will be of weaker intensity. This combination of loops projecting electro-magnetic energy upwards at different frequencies to elevations of different heights provides means for aircraft approaching the landing station to readily locate the landing field and to determine immediately the elevation of the aircraft from the field. For example, the aviator wearing telephone receivers 12 within a helmet hears at a high elevation the audio frequency signal projected from loop 2 having a charactristic note and upon further descent comes within the field of energy projected upward by loop 4 having a different characteristic sound. As previously mentioned, the audio frequency energy could actuate visible indicators placed conveniently before the pilot.

Reference character 13 designates a radio compass signalling station located within the limits of the landing station.

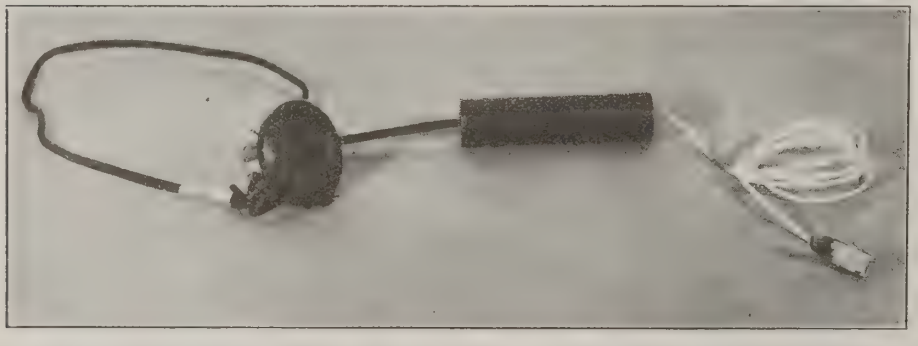
The landing station is also provided with hangars, oil and gas service department, comfort facilities, a cafe, telephone booth, long distance radio telephone and telegraph installations. The radio antenna is shown at 17, elevated above the building 16.

The future success of commercial aerial transportation now awaits the establishment by municipalities the type of aircraft landing station presented.

The adoption of the proposed aircraft landing station together with strict regulations of aerial highways will result in the rapid development of this science and art.



Noiseless music transmitter installed at Walter Reed Hospital, Washington, D. C., the invention of Mr. E. C. Hanson. It sends music to all wards of the hospital, but is audible only to patients wishing to listen



By attaching this receiver to his bed-spring the wounded soldier at Walter Reed Hospital is able to hear the music or words transmitted by the electrostatic phonograph

Benzol for Engine Fuel

The Committee of the National Benzol Association has issued the following specification for benzol for use as engine fuel:

(1) Specific gravity, 0.870 to 0.885.

(2) Distillation test (by flask):

Benzol shall give a distillate of not less than 75 to 80 per cent at 100 deg. C.

Benzol shall give a distillate of not less than 90 per cent at 120 deg. C.

Benzol shall give a distillate of not less than 100 per cent at 125 deg. C.

(3) Sulphur shall not exceed 0.40 per cent.

(4) Benzol shall be entirely free from water.

(5) Color shall be water white.

(6) Rectification test: 90 c.c. of the sample shaken with 10 c.c. of 90 per cent sulphuric acid for 5 min. should not give more than a light brown color to the acid layer.

(7) Benzol shall be entirely free from acids, alkalis and sulphuretted hydrogen.

(8) Benzol shall not freeze at 25 deg. Fahr. below the freezing point of water.

Such a specification should insure general freedom from trouble with this fuel. The tendency which pure benzol has to freeze readily is amply provided against, and this is a good point. The negligible amount of sulphur allowed is also satisfactory, as with it no cylinder corrosion is likely to occur.

—*Motor* (London).

Book Review

ELEMENTARY AERONAUTICS, or The Science and Practice of Aerial Machines. Compiled by Albert P. Thurston, B. Sc. 126 illustrations.

The author has been persuaded to publish this work in the hope that it may be useful in leading others to the scientific study of aeronautics. The aim of the author, therefore, has been to present to the reader a simple and concise account of the action of air upon moving planes, aerocurves, propellers, bars and the like, and the application of these principles to practice.

The theory of the normal and inclined plane and aerocurve is dealt with in Chapters I and II.

An introduction to the important problem of stability has been given in Chapters III and IV. The theories and results deduced in Chapters III and IV appear largely to have been confirmed by various experimenters and scientists since these conclusions were arrived at.

The theory of the propeller and helicopter and the calculations relating to the design of a flying machine are set out in Chapters V, VI and VII. The principal instruments and apparatus used in an aeronautical laboratory are described in Chapter VIII, and the rest of the book is devoted to a description of the chief types of flying machines and engines.

Chapter I, Normal and Inclined Planes; Chapter II, Aerocurves; Chapter III, Automatic Longitudinal Stability and Manual and Automatic Control; Chapter IV, Automatic Lateral Stability; Chapter V, Propellers; Chapter VI, Helicopters; Chapter VII, Calculations Relating to the Design of a Flying Machine; Chapter VIII, Laboratory Instrument and Apparatus; Chapter IX, Types of Machines; Chapter X, Engines. This publication can be purchased at The Aeronautic Library, Inc., 299 Madison Avenue, New York City, at the price of $1.75 post paid.

THE O. W. TIMM MODEL T-18 TRACTOR



THE T-18, designed and built by O. W. Timm, Venice, Cal., is one of the latest types of two-place advance training and sport planes. It has a high safety factor to withstand the severe strains of stunt flying and rough landing. Dual controls are installed.

Tanks contain 40 gallons of gasoline and 5 gallons of oil, which is sufficient for a flight lasting about four hours.

General Dimensions

Span, upper plane	44′ 0″
Span, lower plane	36′ 0″
Chord, upper plane	5′ 0″
Chord, lower plane	3′ 6″
Gap between planes	5′ 0″
Overall length	25′ 0″
Overall height	9′ 6″

Areas	(sq. ft.)
Upper planes	180
Lower planes	118
Ailerons	40
Stabilizer	13.5
Elevators	23
Fin	5
Rudder	10
	pounds
Loading per square foot	5.63

Weights	pounds
Net weight (empty)	988
Gross weight (fully loaded)	1903
Useful load	915
Loading per sq. ft.	5.63

Performance

Maximum speed	97 M.P.H.
Minimum speed	38 M.P.H.
Climb in 10 minutes	7,600 feet
Range of endurance	4 hours

Main Planes

Incidence angle of both planes 2.5 degrees. Main planes are in five sections. Clearance between the sections is ¾″.

Upper plane has no dihedral; lower plane 2½ degrees dihedral.

Ribs are designed from U. S. A. No. 1 data, and are built with 5/32″ 3-ply white poplar webs and 5/32″ by ⅝″ spruce battens. Beams are of I section, spruce.

Ailerons attached to the upper plane are 12′ long and have a chord of 20″. They are constructed entirely of steel tubing. Main members 1⅜″ 18 ga., ribs 5/16″ 20 ga.

Fuselage

Length overall, 19′ 10″; width, 27″; depth, 36″.

The fuselage is built in two sections, being detachable directly back of the rear seat. Front section is built up of ash, channeled for lightness. Longerons are laminated.

Rear sections is of spruce.

Engine mounting is a steel stamping. Complete power plant can be removed in less than twenty minutes by removing 8 bolts and the gasoline line connection.

Landing gear is of the V type. Ackerman wheels, with 26″ by 4″ tires.

Tail Group

Tail group is built entirely of steel tubing, and is as light as wood and much stronger. No wires or braces are used. Stabilizer planes are built in two sections, and the angle of incidence is adjustable.

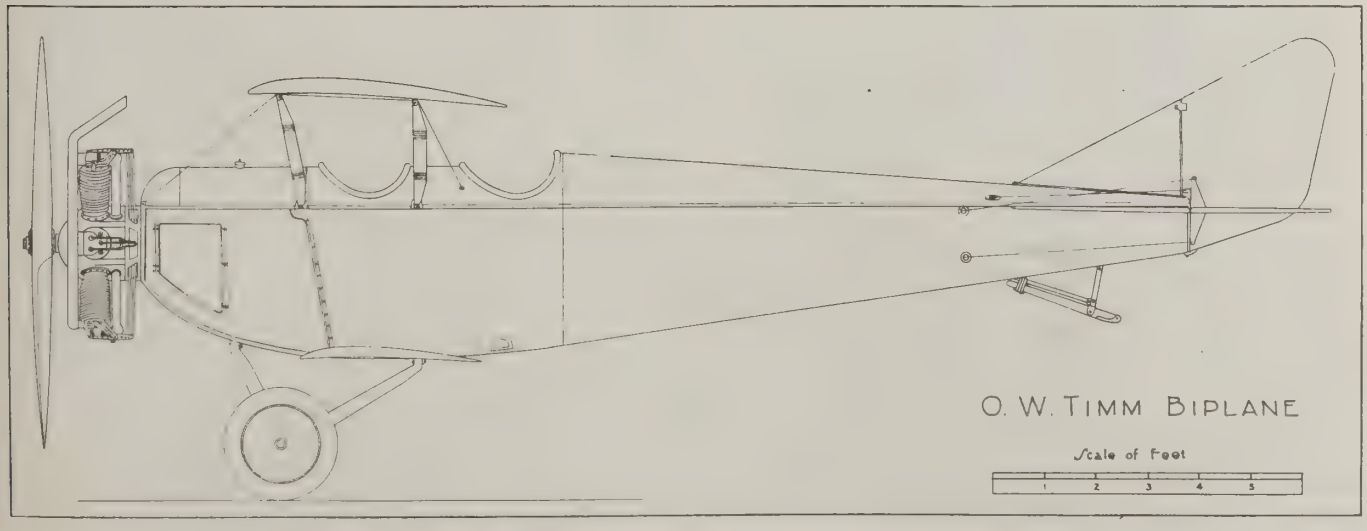
Overall width of stabilizer planes, 8′ 10″; overall depth, 3′ 4″; overall width of elevator, 10′ 9″; overall depth, 33″; overall width of rudder, 36″; overall depth, 52″.

Engine

The O. W. T. engine is a six-cylinder radial type air-cooled, rated 125 H. P. at 1475 R.P.M. Bore 5″, stroke, 6″. The weight, complete ready to run is 325 lbs.

Cylinders are machined from solid steel forgings. Cylinder heads are of semi-steel castings, and are screwed and welded into the cylinders. Each cylinder is attached to the crankcase by means of 8 studs.

Pistons are of cast iron. The heads are flat, and well webed for strength and cooling. Three double seal rings are used on each piston.



Side elevation of the Otto W. Timm Tractor, with an O. W. Timm H.P. radial engine

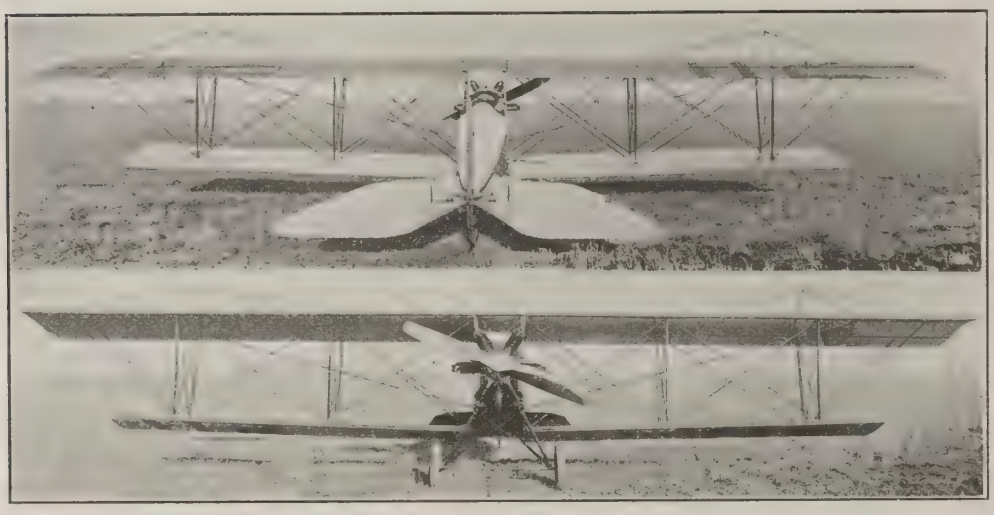
A double throw counterbalanced crankshaft of chrome nickel steel is used.

Connecting rods of chrome nickel steel. They are round, of constant section, and hollowed for lightness. They are machined all over. Bearings of bronze, babbit lined with steel retainers. Wrist pins of nickel steel and float in the rods.

One cam shaft with two cams operate all the valves. The push rods have ball and socket ends, and are adjustable. Valves are of tungsten steel. Two exhaust valves 1 15/16" in diameter and one intake valve 2⅛" in diameter to each cyl.

Two magnetoes and a 2" Miller carbureter are used.

A special type of oil distributor working under a constant pressure of 20 to 40 pounds, and timed with the pistons supplies the engine with the correct amount of oil at all speeds.



The O. W. Timm Model T-18 Tractor, which has a speed range of 38-97 m.p.h. with an O. W. T. 6 cylinder 125 H.P. radial engine

TWO SIMPLE TESTS FOR INSPECTION OF AEROPLANE STRUTS

IN the field of testing, slender struts are unique. No other structural members can be tested to maximum load without injury, nor will they permit of the securing of data for an accurate computation of the maximum load, but with slender struts either of these things can be done very simply. The following two methods have been developed and verified by the Forest Products Laboratory as of practical application in strut inspection.

First Method of Test

The strut may be loaded as such, increasing the load gradually till the maximum is reached—that is, until the load ceases to increase with increasing deflection. Repeated experiments on Sitka spruce and Douglas fir aeroplane struts of various patterns have shown that, if stopped at this point, the test does not injure the strut, provided the slenderness ratio (L/r) is 100 or more. The accompanying sketch illustrates a simple machine by which struts may be tested in this way at the rate of 100 or more an hour.

Simple Strut Testing Machine

The strut *S* is supported on knife edges. The load is applied by a handscrew *H* and is measured by a dynamometer *D*. The screw is turned until the pointer of the dynamometer ceases to move; the load then recorded is the maximum load of the strut.

Second Method of Test

The strut is tested as a beam. It is supported by a knife-edge at either end and loaded in the middle, one knife-edge being placed on a platform scale to measure the reaction. The reaction R and corresponding deflection are carefully measured for one or more loads (safely within the elastic limit). The ratio

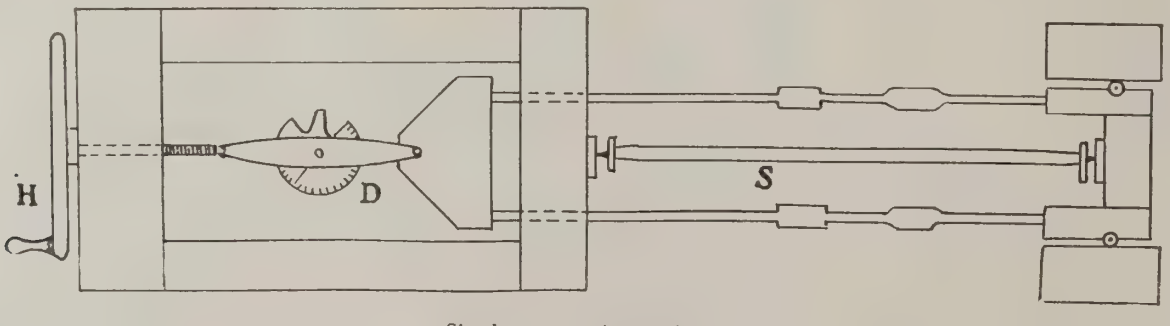
$$\frac{2R}{d} = p,$$

which is constant up to the elastic limit, may now be substituted in the formula,

$$Q = 0.206 \quad \frac{l}{L^2} p$$

where l = span used in beam test
L = effective length of strut
Q = Euler or maximum load of the strut as such (pin-end conditions).

Numerous tests on Sitka spruce and Douglas fir struts have proved that this method can be relied upon to give the maximum load to within about 5 per cent. of the correct value for struts which have a slenderness ratio of 100 or more, and are uniform in cross-section or tapered not too severely.—Technical Notes of the First Products Laboratory, U. S. Forest Service.



Simple strut testing machine

THE SUNBEAM AIRSHIP ENGINE

THE Sunbeam Company carried out the supply and manufacture and erection of the whole of the machinery for the British Airships R-33 and R-34. This machinery comprises in addition to the engines the clutches, intermediate shafts, reduction gear, propeller shafts and propellers, together with the piping, radiators, oil and water tanks.

The Sunbeam "Maori 4" type have been specially designed for airship use. These have 12 cylinders in two rows of six each set in "V" form at an angle of 60 degrees. The cylinders are of 110m/m bore and 135m/m stroke, each having four overhead valves which are actuated by two camshafts to each row of cylinders, the camshaft drive being by a train of gears.

The articulated system is adopted for the connecting rods and a flywheel is fitted to the crankshaft. These engines are designed to run at 2100 revolutions per minute, the B.H.P. at this speed being 275.

Carburetors, of which there are four, are of the Claudel Hobson B.Z.S. 38 type, and are fitted outside the "V", petrol being fed to them either by gravity or by pressure. The ignition is by two 12 cylinder magnetos.

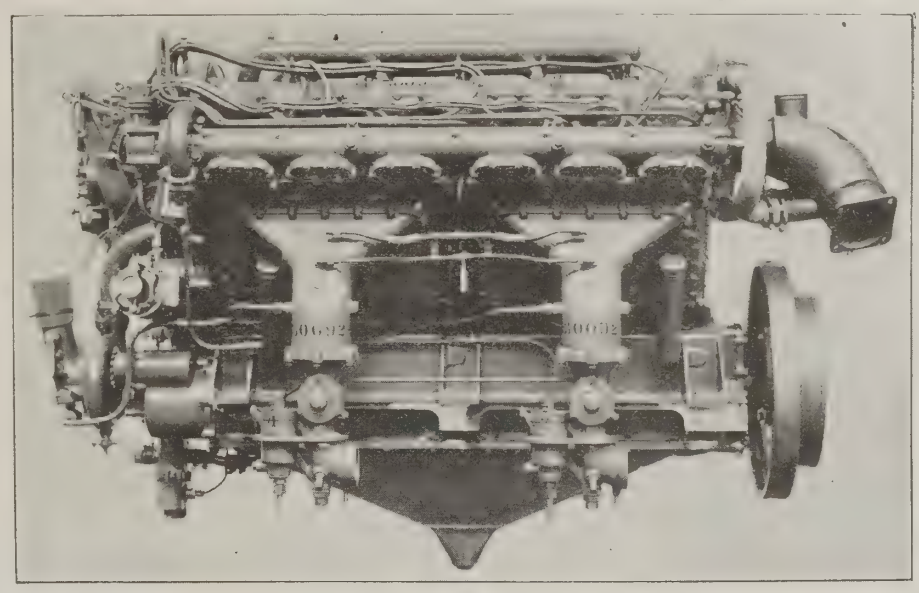
The water pump is of specially large dimensions and a governor is fitted so that when the engine speed reaches 2500 r,p,m, or when the oil pressure falls below 20 lbs. per square inch, the ignition is cut off.

A hand starter and compressed air starter are provided. The exhaust pipes are provided with a special arrangement for cooling by water. The flywheel carries one element of a friction clutch. This element is driven from the flywheel by means of a series of composite leather and brass driving pieces which are interposed to equalize the stresses on the teeth of the main wheels. The clutch itself is of the multiple disc type with a single central spring and contains a series of ten phosphor bronze plates of special alloy making frictional contact with ten similar plates of steel. The central spring is operated by a lever on the control station in connection with the engine through a pair of collars fitted with an eccentric link in such a way that the pressure of the spring is balanced when driving, and the end load on the crankshaft is reduced to a minimum when declutching.

From the clutch the power is led by means of an intermediate shaft, fitted with a dog coupling for permanent disengagement when necessary, to a gear box fitted to the after end of each gondola. The gear boxes are of three types. In the forward gondola the gear box is a plain reduction type without reverse gear, reducing the speed from the crankshaft revolutions of 2100 to 540 per minute.

The second gear box is of reversing type and is used on the wing cars, and gives similar reduction, but allows by means of sliding gears for the direction of rotation of the propeller to be changed for manoeuvring purposes.

(*Continued on page* 510)



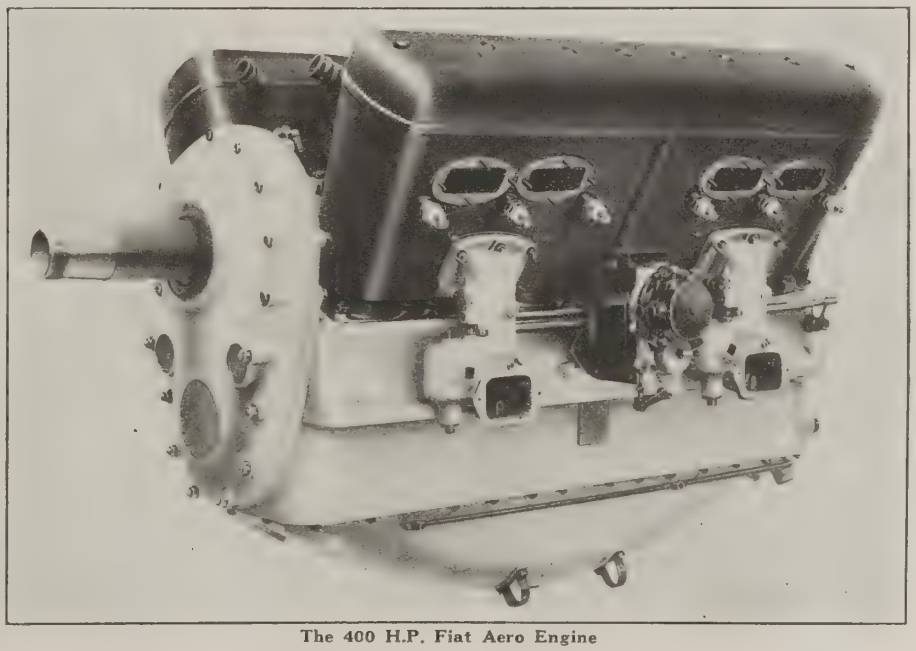
The Sunbeam "Maori 4" 275 H.P., with which the British Dirigible R-34 is equipped

THE 400 H.P. FIAT AERO ENGINE

THE latest type of aviation engine to be produced by the Fiat Company is a particularly interesting 12-cylinder developing 400 horsepower. In this new engine the designers have succeeded in obtaining very complete accessibility, in getting a reduced overall area, and a very low weight per horsepower.

The cylinders, which have a bore of 120 mm. and a stroke of 150 mm., are of steel, with a common water jacket for each group of six. The valves are placed in the cylinder head, but are covered by a metal housing which prevents any oil leakage. Operation of the overhead camshafts is by means of a vertical shaft and bevel gearing for each group of cylinders. There are four carbureters, carried on the outside of the cylinders. Equal accessibility is obtained for the magnetos by driving them from a central cross shaft, each magneto thus being placed between two carbureters. With this design the mechanics have complete accessibility, merely by the removal of the engine housing, to the carbureters, the plugs, and the magnetos, the only parts likely to require frequent attention.

The propeller is the geared-down type, with a ratio of 1 to 1.51, and for war purposes was designed for a gun to be fired through it. Normal engine speed is 2,300 revolutions, at which speed 400 h.p. is developed. At the maximum engine speed of 2,500 revolutions the power is 450. Weight of the engine empty, 770 pounds; weight with cooling water, 826 pounds; weight with all on, 890 pounds. Weight per horsepower, with water and radiator, 1.9 pounds. The engine has a fuel consumption guaranteed of 8.4 ounces per horsepower-hour, and a minimum consumption of 7.7 ounces per horsepower-hour.



The 400 H.P. Fiat Aero Engine

THE PRINCIPLES OF AEROPLANE CONSTRUCTION

By CAPTAIN JAMES VERNON MARTIN

(Continued from page 450)

THE types of single truss which have been tested are quite numerous (see Plate 7) and the fact of their discard proves that most of them have disadvantages in excess of their promise. The first single truss to prove practicable was the Breguet tractor biplane single strut type of 1911, which utilized flat steel springs to hold the ribs and wings in constant relation to the plane of the fuselage. It was found that after use and exposure to varying temperatures the springs varied so much to impair the efficiency of the aeroplane through lack of uniformity in the angle of incidence.

Another method of employing the single truss and retaining a rigid wing was tried by Mr. Sigrist of the Sopwith concern in England (Fig. 2, Plate 7), shows a semicircular arc passing through the strut and arranged so the incidence could be varied with ease, but practice showed this construction to be weak in introducing bending movements into the strut and in failing to provide sufficient rigidity to care for rearward movements of the center of pressure. Another disadvantage was found in the excessive structural resistance of the arc. A modification of this structure was the elimination of the forward portion of the arc, which lessened the structural resistance but retained the other disadvantages.

One of the most promising of the single truss types has been found in the so called pillar strut (see Fig. 4, Plate 7), which is used in a few planes of recent design, but this structure has been very fully tested and condemned by the Royal Aircraft Factory since it fails to provide the desired rigidity and increases the weight and structural resistance of the strut at the ends.

Fig. 5 shows a form of single truss approved by certain officials of the U. S. Navy. This form provides a rigid wing structure without introducing bending moments into the strut and also provides a ready means (by turning the tension rods) of varying the incidence of the planes. It is proposed to further reduce the structural resistance of this truss by paneling in the rods with the strut (Fig. 6, Plate 7) but to do this would seriously interfere with both vision and stability.

I have urged upon our authorities the substitution of the K-bar cellule truss (Plate 8) since it answers all the requirements without attendant disadvantages. It provides a rigid wing structure without introducing bending moments into the strut, since a rearward center of pressure movement causing a compression in the bar b will cause an almost equal tension in bar a, but the horizontal components of these forces neutralize each other in the bolt and only the sum of their vertical components is introduced into the strut. This is a most desirable feature because the lack of vertical dimension in the average rear wing bar renders it relatively incompetent to resist multiple lift stress, especially since it has the task of resisting practically all of the drift stress in compression of the wing. Thus the K-bar functions to concentrate the lift stress of the cellule about the central wing bar and the drift stress can be entirely trussed from the leading edge bar to the rear wing bar. Such a truss greatly simplifies the calculation of cellule stresses and eliminates the necessity of bridging the lift stress through the ribs as in the double truss type. By use of the K-bar truss we achieve an elimination of considerable structural resistance and a two-way reduction of interference while obtaining a saving in weight and securing a rigid wing structure. It will also be noted that by revolving the bars a and b, which are threaded into fittings at their ends, the incidence of either plane may be varied at will.

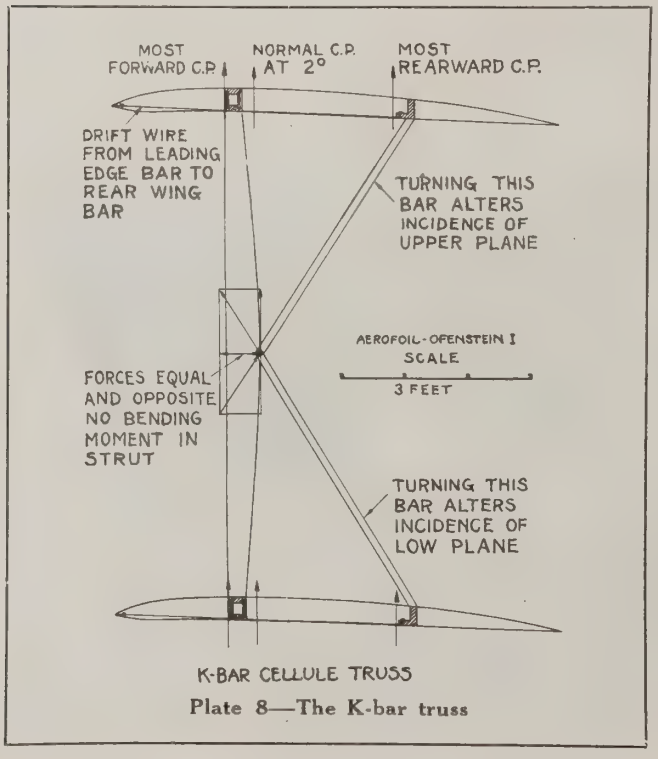


Plate 8—The K-bar truss

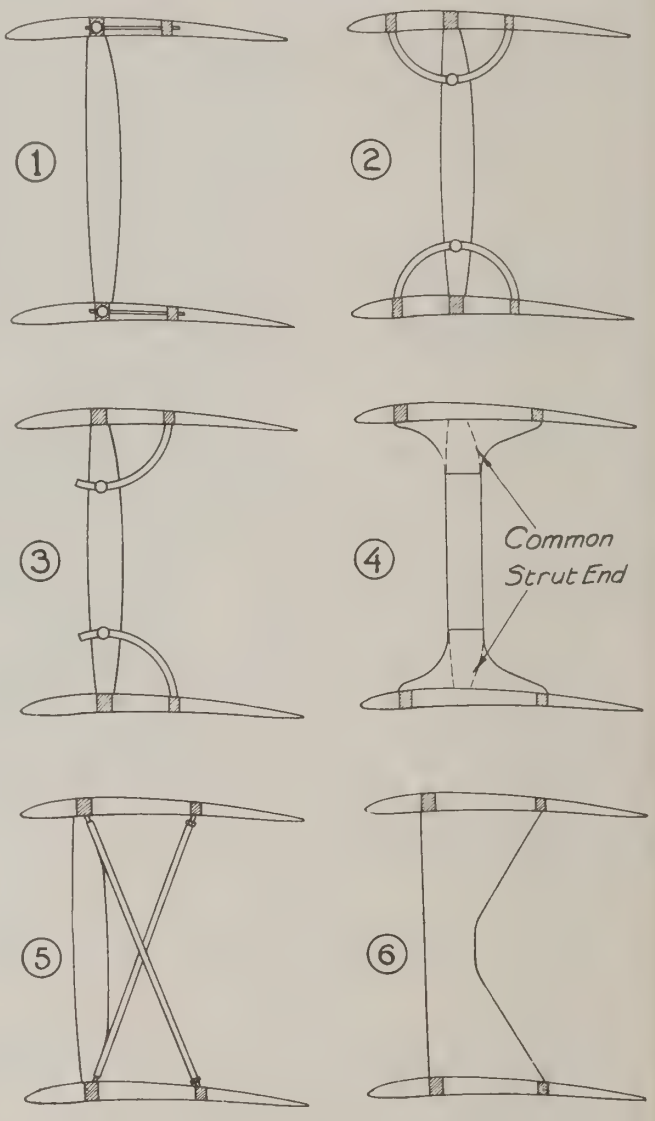


Plate 7—Various single lift trusses

Comparison of Resistance and Weight of K-Bar and Double Lift Truss Systems

At a speed of 100 m.p.h.,
Wing loading of No. 9 sq. ft.,
Safety factor of 8,
Aspect ratio of six,
Gap/chord ratio of K-bar Truss—1.143,
Gap/chord ratio of double lift Truss—1.

Resistance of K-bar Truss is $\frac{97.2}{185.0} = 52.5\%$ of resistance of Double Lift Truss.

Weight of K-bar Truss is $\frac{106.45}{146.57} = 72.7\%$ weight of Double Lift Truss.

Resistance and Weight of K-Bar Truss System

Member	Size	Lgth.	Area (sq. ft.)	Kx.	No.	Rx. #	Wt. #
(Wires)							
Inner Panel Lift	1/2	141	.49	.0026	2	25.4	19.1
Inner Panel Landing	3/16	141	.306	.0026	2	15.9	9.55
Outer Panel Lift	1/8	154	.334	.0026	2	17.3	10.4
Outer Panel Landing	1/16	154	.2	.0026	2	10.4	3.9
(Struts)							
Inner	2.64	96	1.76	.0004	2	14.1	31.0
Outer	1.98	96	1.32	.0004	2	10.5	17.5
(K-Bars)							
Inner Upper	7/8	56	.34	.0004	2	2.7	1.7
Inner Lower	1 1/2	56	.583	.0004	2	4.7	5.2
Outer Upper	5/8	56	.243	.0004	2	1.9	1.7
Outer Lower	1 3/8	56	.535	.0004	2	4.3	6.4
						97.2	106.45

Resistance and Weight of Double Lift Truss System

Member	Size	Lgth.	Area (sq. ft.)	Kx.	No.	Rx. #	Wt. #
(Wires)							
Rear Inner Panel Lift	1/2	131	.455	.0026	2	23.6	17.7
Rear Inner Panel Landing	3/16	131	.284	.0026	2	14.8	8.85
Rear Outer Panel Lift	5/16	147	.318	.0026	2	16.5	9.9
Rear Outer Panel Landing	3/16	147	.191	.0026	2	9.9	3.72
Front Inner Panel Lift	7/16	131	.398	.0026	2	20.7	13.7
Front Inner Panel Landing	1/4	131	.228	.0026	2	11.8	6.5
Front Outer Panel Lift	1/4	147	.256	.0026	2	13.3	7.3
Front Outer Panel Landing	1/8	147	.128	.0026	2	6.6	2.4
Inner Panel Inner	1/4	95	.166	.0026	4	17.3	9.1
Outer Panel Inner	3/32	95	.124	.0026	4	12.9	1.8
(Struts)							
Rear Inner	2.42	84	1.41	.0004	2	11.3	22.8
Rear Outer	1.74	84	1.01	.0004	2	8.1	11.8
Front Inner	2.29	84	1.33	.0004	2	10.6	20.5
Front Outer	1.64	84	.96	.0004	2	7.6	10.5
						185.0	146.57

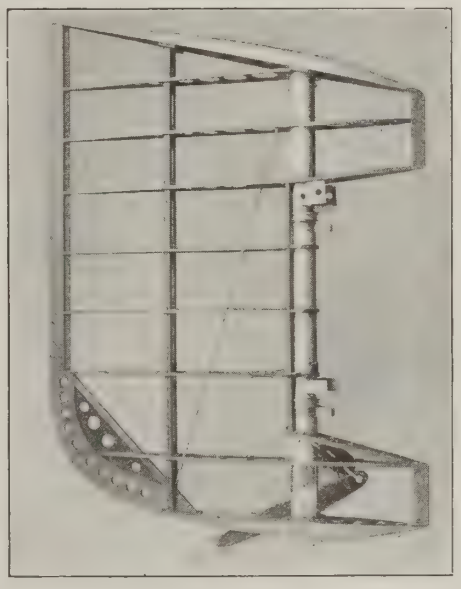


Plate 10—Shock absorbing rudder



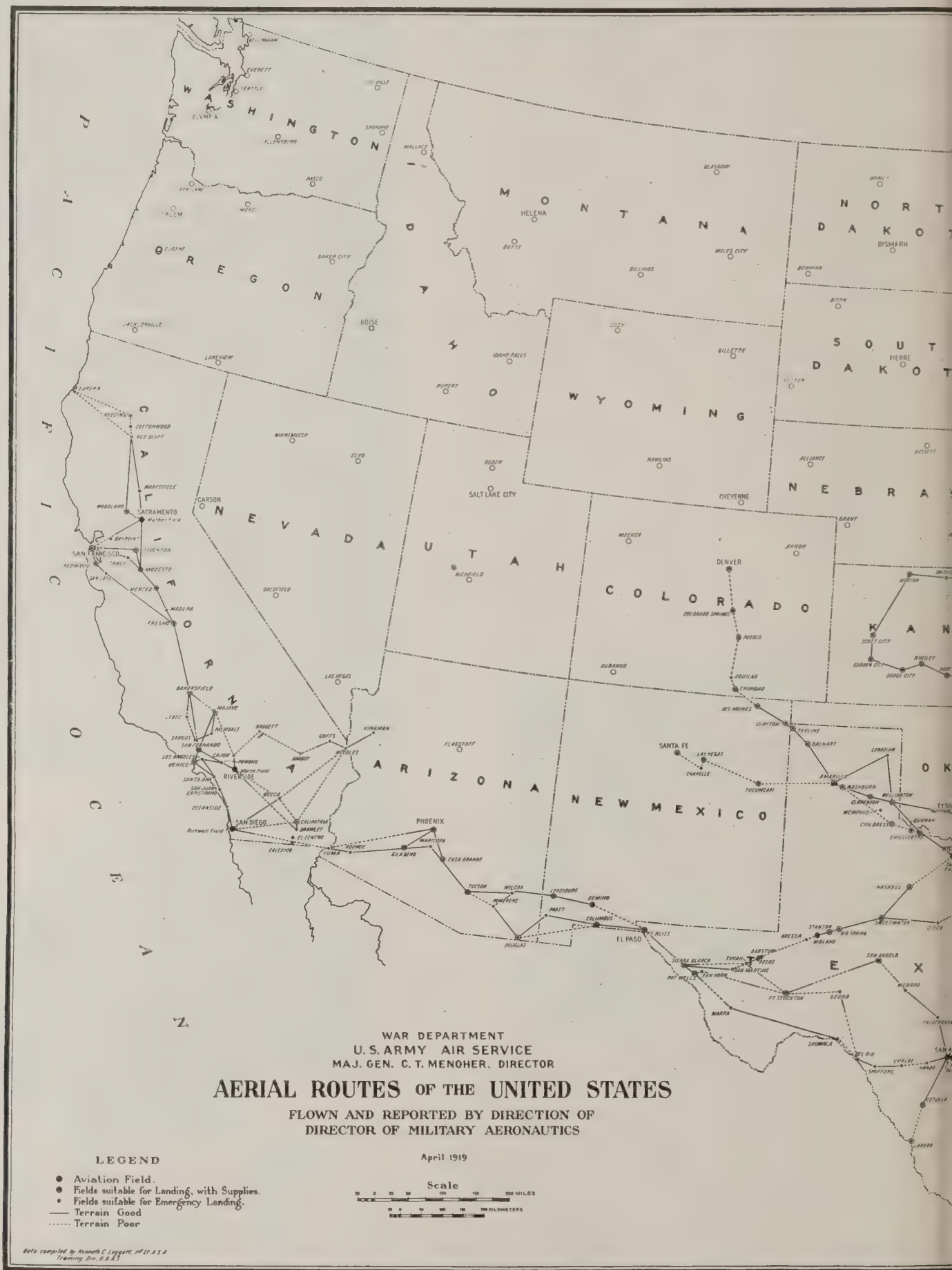
Plate 9—Chassis structure

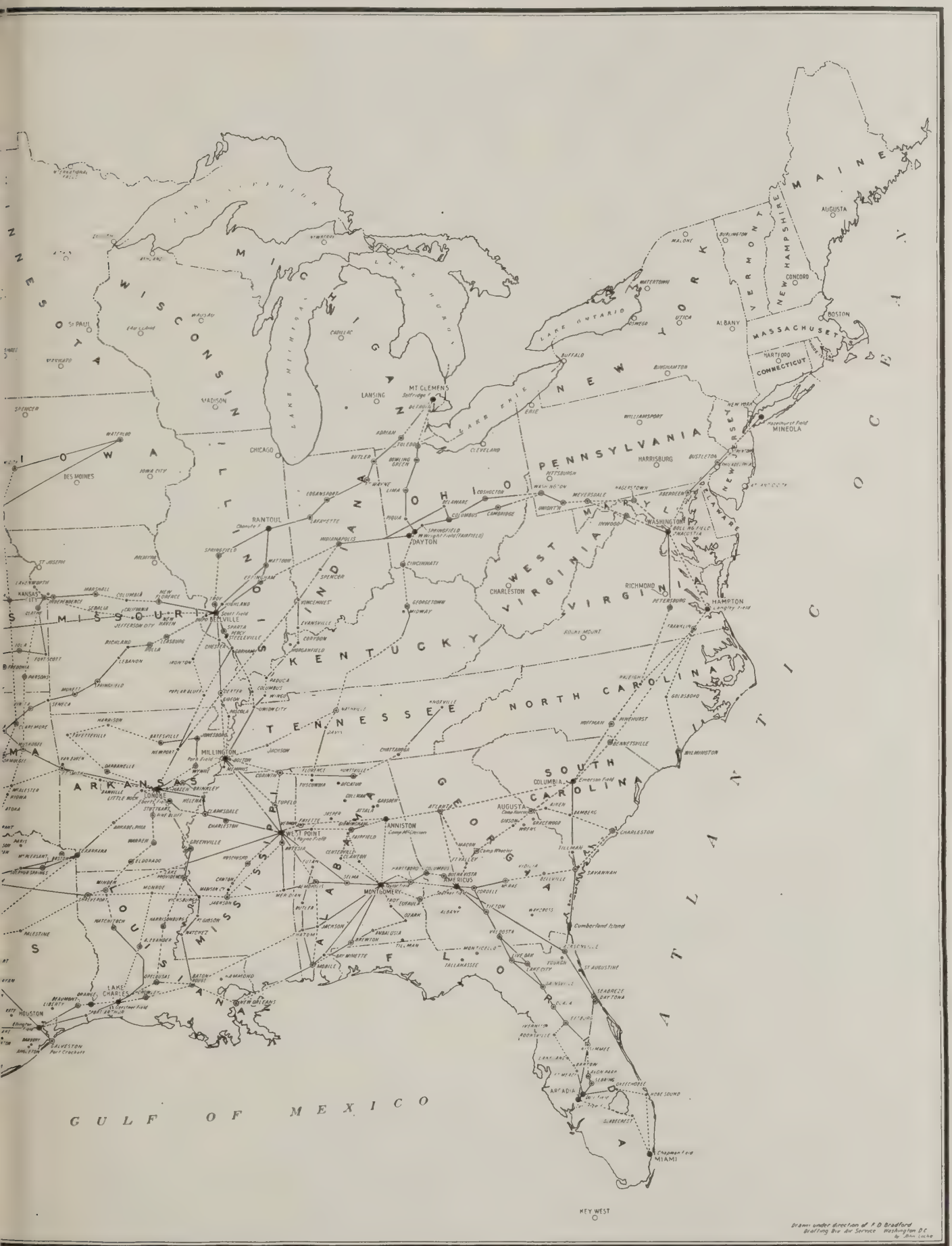
It does not seem to me possible at this writing to further reduce the element of useless resistance and interference in the cellule truss, so let us pass to the third portion of our division the chassis. This element represents from 10 to 12% of the total drift in the average aeroplane at 100 m.p.h. and from 15 to 20% of the structural resistance.

The simplification of the parts of a chassis is no easy matter and there is little basis other than practice to guide the engineer. Fortunately, this is one of the features of an aeroplane which has had much attention and the process of elimination by trial has left us a type of chassis almost universally in use and of great simplicity. Roughly, it consists of an axle member spaced from the fuselage by two V's in the longitudinal plane, while two sets of wires truss transversely for sheer. A still greater simplification is the replacement of these four wires by a single diagonal in the front frame to take sheer in both directions and the location of the shock absorbing means in the wheel so that the axle itself may form the transverse lower member of the front frame. Thus the rear members of the V's are used only to steady the front frame in the desired position.

Without adding to the weight or structural resistance of this simple form the members of the front frame may be welded together and the upper forward ends journaled with-

(*Continued on page* 498)


WAR DEPARTMENT
U. S. ARMY AIR SERVICE
MAJ. GEN. C. T. MENOHER, DIRECTOR
AERIAL ROUTES OF THE UNITED STATES
FLOWN AND REPORTED BY DIRECTION OF
DIRECTOR OF MILITARY AERONAUTICS
April 1919
LEGEND
Aviation Field.
Fields suitable for Landing, with Supplies.
Fields suitable for Emergency Landing.
Terrain Good
Terrain Poor
Scale
Data compiled by Kenneth C. Leggett, 1st Lt. A.S.A.
Training Div., O.A.I.
WASHINGTON
OREGON
MONTANA
WYOMING
NEVADA
UTAH
COLORADO
ARIZONA
NEW MEXICO
PACIFIC OCEAN
SEATTLE
SPOKANE
HELENA
BUTTE
BOISE
SALT LAKE CITY
DENVER
SACRAMENTO
SAN FRANCISCO
LOS ANGELES
SAN DIEGO
PHOENIX
TUCSON
EL PASO
SANTA FE


MINNESOTA
WISCONSIN
MICHIGAN
LAKE MICHIGAN
LAKE HURON
LAKE ONTARIO
LAKE ERIE
NEW YORK
MAINE
VERMONT
NEW HAMPSHIRE
MASSACHUSETTS
CONNECTICUT
IOWA
ILLINOIS
INDIANA
OHIO
PENNSYLVANIA
NEW JERSEY
MARYLAND
DELAWARE
WEST VIRGINIA
VIRGINIA
KENTUCKY
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
MISSOURI
ARKANSAS
MISSISSIPPI
ALABAMA
LOUISIANA
FLORIDA
ATLANTIC OCEAN
GULF OF MEXICO
CHICAGO
DAYTON
WASHINGTON
RICHMOND
CHARLESTON
MONTGOMERY
WEST POINT
MILLINGTON
MINEOLA
MIAMI
KEY WEST
Drawn under direction of F.D. Bradford
Drafting Div. Air Service Washington D.C.
by J. Ben Locke

in the fuselage. (See Fig. 1, Plate 9.) Slots can then be provided in the external skin of the fuselage, so shaped as to house the chassis frame members when the chassis is swung backward and upward. (Fig. 2, Plate 9).

Leaving the forward portion of the frame members flat, very slightly increases the resistance of these members and permits them to form a flush surface with the bottom skin of the fuselage when retracted. (See Fig. 3, Plate 9).

Of course there are other ways of retracting a chassis, but in order to meet both aerodynamical and practical demands the following will be recognized as indispensable features:

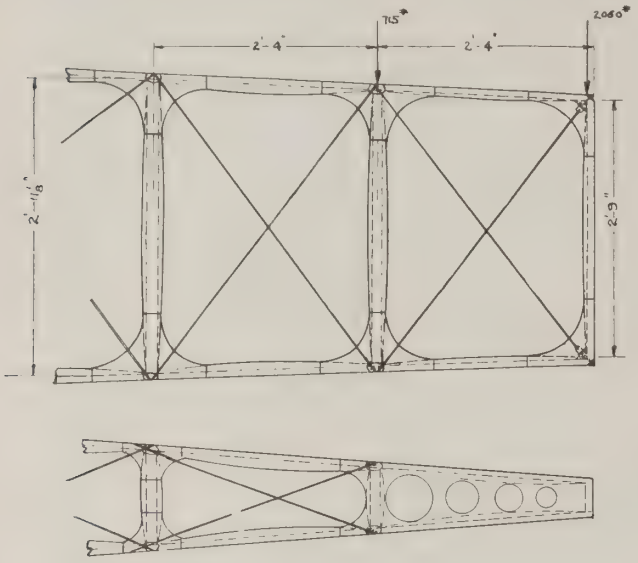


Plate 11—New type Plywood Truss

1. The chassis should be equally strong in spite of its retractable feature;
2. It should neither occupy useful space when retracted nor require an enlarged fuselage to house it;
3. It should not weigh more, including retracting mechanism, than the ordinary chassis;*
4. It should be adapted in strength as an alighting device in any intermediate position between fully extended and fully retracted both in case the pilot should make a hurried descent and in order to make available a handy means of varying the position of the chassis relative to the center of gravity of the aeroplane;
5. It should automatically close the housing recesses so that the fuselage or wing skin forms a flush surface when retracted;
6. The gage of chassis should be independent of the width of the fuselage;
7. It should utilize the forces of flight, since they are always available, for power to retract and extend and such action should be entirely automatic when released by the pilot.

A chassis answering the above requirements has been installed on a plane for the U. S. Army, but further details are not now available for publication. Thus we dispose of the third member of our subdivision and in a like manner we can dispose of the fourth, for it requires no great ingenuity to completely enclose all control leads and brackets and to internally truss the empennage members; as a proof of the latter see Plate 10, which shows an entirely successful method of disposing the tail skid within the rudder skin and in addition adds to the maneuverability of the machine when taxying on the ground.

We have now disposed of two of the four members of our useless division and reduced the remaining two to a minimum. For instance, it appears to the writer that in a machine like the U. S. Liberty Reconnaissance Fighter, where the empennage has been reduced to its two fundamental elements, the directional and longitudinal members must always remain, no matter how many years of aeroplane evolution transpire.

A Tractor Biplane has already been designed on the principle herein enunciated and the wind tunnel tests show a lift/drift ratio of nearly 11 with an aspect ratio of 6. An increase to more than 12 could be expected with an aspect ratio of 10.

These considerations form the basis of the writer's opinion that the conventional type of tractor biplane has a better chance of surviving from the aerodynamic standpoint than has the perfect or wing type aeroplane of small aspect ratio.

* It is relatively unimportant whether it creates slightly more resistance when extended, since a modern aeroplane always has surplus power to get away and structural resistance is an aid in reducing the landing speed.

Useful or Aerofoil Resistance

An aerofoil is a form or body projected through the atmosphere for an aerodynamic reaction. Thus a strut, wire, fuselage or chassis is not an aerofoil, but the main wing, the propeller blades, the ailerons, elevator damper and rudder are aerofoils because they function through the lift/drift ratio which might well be called the aeroplane first principle.

The lift or Ky of an aerofoil is the force, exclusive of inertia or gravity, which tends to deflect the aerofoil from the plane of propulsion.

The drift of an aerofoil is the resistance it offers to propulsion, exclusive of inertia or gravity.

We discover empirically that certain forms when propelled through the atmosphere have the properties of lift and drift and also that the ratio of lift to drift amounts to as much as 24 to 1 at 40 m.p.h. with an increase of 10% for double increments of speed, etc. Although there have been many theories as to the cause or causes of the properties of aerofoils and these theories are responsible for the shape of some aerofoils, I believe it can truthfully be said that what we know about aerofoils to-day is simply the result of testing flat aerofoils and haphazard forms of all varieties.

This statement will no doubt offend several of my esteemed contemporaries who have well nourished theories of air influences on aerofoils, but the fact remains that given any of these pet theories as a guide for the construction of an aerofoil, and the aerofoil tested almost infallibly proves surprising in its lack of substantiation. On the other hand, the nearest thing to a principle for guidance in designing an aerofoil that the writer knows anything about is the injunction to copy an aerofoil known to possess specific qualities, and even this is a most precarious procedure unless the copying be exact, for the smallest changes produce results all out of proportion to expectation and my own experience in this field of aerodynamics woud lead me to say that test of the particular model is the only reliable criterion as to its peculiarities. In short, the study of aerofoil theory and form has not yet reached the stage where any general conclusions can be drawn from which it would be safe to deduce the exact properties belonging to a specific form. Of the laboratorial work now definitely planned and urgently needed fully 90% is not underway for want of facilities and it is a shame that our government does not appropriate for further wind tunnels and an adequate computing force.

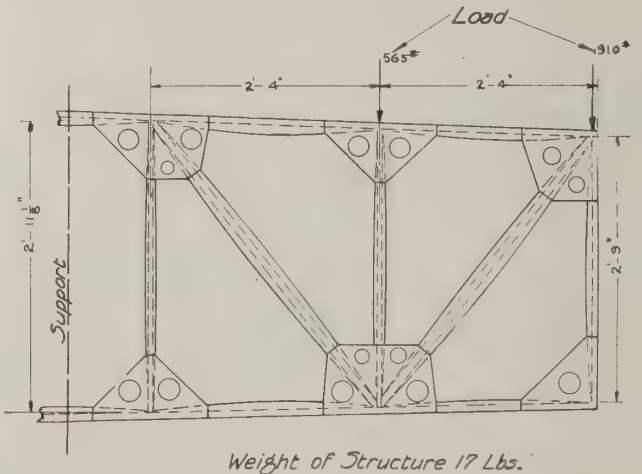


Plate 12—Plywood truss test

Of course the subject of aerofoils is a specialty in itself and cannot be discussed in a resume of the herein-undertaken sort. That branch of the study of aerofoils which deals with propulsion is a work in itself calculated to engage all the energy and intelligence of the best specialist.

This is a good place to introduce to the reader the Third Factor Aeroplane Principle as follows: You will observe that in the ordinary aeroplane we oppose the large component or Ky of the aerofoil resultant to the gravity of the aeroplane, fuel and useful load we wish to carry and the small component of Kx of the aerofoil to the thrust we develop. But in an aeroplane having a total lift/drift of 10 the thrust we expend is actually only one-tenth the air pressure in pounds we generate by virtue of the property of the sustaining aerofoil. Both these pressures exist simul-

taneously and the greater as a consequence of the lesser; but we compound the use of this advantageous principle by opposing the Ky or large element of the propeller blade to overcome the Kx or small element of the main aerofoil while we overcome the small or Kx element of the propeller blade by the gas pressure in pounds developed within the cylinders of our motor.

Now, if the total lift/drift ratio of the propeller equals ten or better then the actual pounds pressure in thrust of the propeller equals ten times the pounds pressure required to propel the propeller applied at the center of resistance of each blade, but if a smaller propeller were arranged at this point on each blade and the lift/drift of the smaller blade were ten or better, then only one-tenth the pounds pressure required to drive the large blade would be needed to drive the small blade, but the small blade would develop the thrust required to drive the large blade!

Control Aerofoils

Turning now to the control branch of aerofoils, we discover certain principles as fundamental as those in other fields and in practice we often find them ignored.

In general terms a control aerofoil is distinguished by its function of producing a moment about one of the three axes of an aeroplane. When the aeroplane is in flight at a given speed, these moments are determined by the area, leverage, incidence and lift/drift ratio of the aerofoil. The member used to create the moment about the normal vertical axis is termed a rudder. The aerofoil employed to exert a moment about the transverse axis is termed an elevator (poor word) and the aerofoil functioning to produce a movement about the longitudinal axis is termed an aileron. Among the important principles which should govern the form and disposition of controls are the following:

1. *There should be no cross functioning such as attempting to utilize a control surface at one time for sustentation and at another time for control. This principle is fundamental and thoroughly defendable.*

2. *A control aerofoil should be disposed free of interference or if this is impossible, the interference should be calculable and uniform in effect. A wing end aileron is so disposed, a trailing edge aileron is not.*

3. *A control aerofoil should be so disposed as to exert its moment on an axis at right angles to that about which it functions, i.e., ailerons should be on the transverse axis, elevator and rudder on longitudinal axis. A wing end aileron is so disposed, a trailing edge aileron is not.*

4. *Since the required moment may be created by less area and more leverage, a control aerofoil should be disposed as far from the axis about which it functions as is practical structurally. (A wing end aileron has a much greater leverage than a trailing edge aileron.)*

5. *A control aerofoil should be of a double convex symmetrical form in order to conform to the folowing:*

A control aerofoil should have a very slight Kx coefficient at neutral position.

A control aerofoil should have no Ky at neutral position and equal Ky coefficients at equal and opposite angles of incidence.

A control aerofoil should have practically no movement of its center of pressure for small angles. (See Fig. 1, Plate 1).

A control aerofoil should have both its greatest cambre and its axis of support at its center of pressure.

A control aerofoil should be of deep cambre to entirely enclose its support and operating mechanism.

Lateral control aerofoils should be neutralized so that they always create equal head resistance and are independent of the incidence of the main aerofoil.

The justification and application of the above principles is beyond the scope of this outline. I hope to prepare a treatise on aeroplane stability; such a treatise will also deal with the disposition of the mass within an aeroplane which is very properly an aerodynamic subject, but one too broad for more than a reference here. I shall close this branch of our subject by stating that practice indicates a neutral aeroplane to be the best and a neutral aeroplane is obtained by designing an aeroplane with concentric centers of gravity, lift, thrust, and drift (in short one having a Cutex) (see Plate 3), and eliminating all modifications of the wing for inherent stability, I believe cellule decalage, swept back wings, dihedrals, staggers, variations of cambre and incidence and varied plan form are taboo so far as stability is concerned.

Aerodynamic Aeroplane Control

What is meant by the "Principle of Aerodynamic Aeroplane Control?"

Briefly, I understand that aerodynamic aeroplane control comprehends use of the variations in the direction and velocity of the air flow local to an aeroplane extremity to produce an incidence of a control aerofoil.

There are six possible means as follows:

1. Increase of the air velocity;
2. Decrease of the air velocity;
3. Updraft or increased incidence;
4. Down draft or decreased incidence;
5. Right oblique airs;
6. Left oblique airs.

In order for a neutral aeroplane to be deflected from a normal position, one or more of the above variations must be present, local to either the lateral or longitudinal extremity.

When sensitive aerofoils are disposed at the aeroplane extremity so connected to the ailerons or empennage controls as to operate said controls to counteract the effect of the air variations on the aeroplane the plane may be said to be aerodynamically controlled.

The accuracy and instantaneousness of such control will be apparent as contrasted with manual or automatic control which operates as a consequence of deflection from the normal instead of through the cause of deflection, thus anticipating and curtailing such deflection.

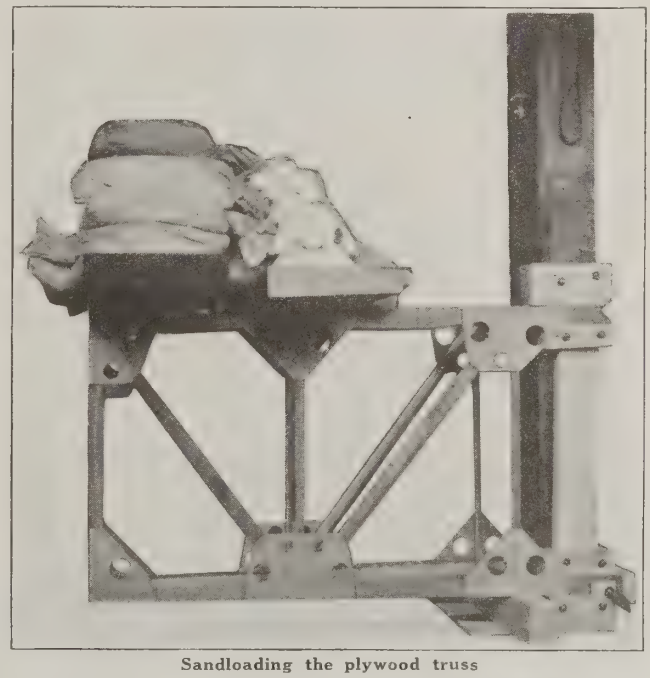
The subject of aerodynamic control will be fully treated in the treatise on aeroplane stability.

Internal Aspect

The first principle of the structural aspect may be tersely phrased as "Greatest strength for least weight."

Unless the structural features of the aeroplane are well cared for, the lift of the plane may be vitiated and the advantages gained by an excellent aerodynamic aspect lost.

The dimensions and total stresses are determined by the aerodynamic aspect and the structural engineer's first job should be the preparation of a plan in perspective of the external surfaces and lines of the plane with the essential weights such as motor, tanks and useful load placed in positions of advantage for simplified trussing.



Sandloading the plywood truss

Of course the motor, pilot, gun, camera, mail or other weights to be carried should be so disposed relative to the transverse axis of the machine that the algebraic sum of their moments at that axis is zero.

Plate 3 shows a fuselage outline as an example of the above. The periphery of this body obtained by giving the minimum required enclosed cubic the best streamline form provides the dimentional limit for the structural engineer and his special task is to truss the allotted weight to the best advantage, always maintaining a uniform safety factor and selecting both materials and form of construction with a keen sense of discrimination to save weight and make accessible the various instruments enclosed. The most direct procedure is to sketch in the points of attachment for cellule, chassis and empennage and then construct a line stress diagram.

Having in this way determined the amount and location of the stresses, we next enter the intensely practical field of electing the material and form of construction to be employed.

(*Continued on page* 508)

The AIRCRAFT TRADE REVIEW

Curtiss Co. Fights Plane Sales Here

The Curtiss Aeroplane and Motor Corporation started suit in the United States Court yesterday to restrain the United Aircraft Engineering Corporation from selling aeroplanes which the corporation purchased from the British Government in Canada to purchases in the United States. The Curtiss alleges that the sale of these would be an infringement on thirteen patents owned by that concern, some of them controlling and basic and others covering certain structural features of the planes.

In the bill filed yesterday the Curtiss Company alleges the planes were manufactured in Canada and are exact copies of the Curtiss planes. This type of aeroplane was selected by the British Government as training planes at outbreak of the European war, and large numbers were ordered sent to Canada for training pilots there. The Curtiss Company alleges that the demand for them was so great that in order to expedite production a contract was entered into with the British Government by which the latter was granted the right to manufacture the Curtiss plane on condition that the planes were to be used only by the British Government for war purposes, and only in Canada. It is alleged that these planes are the ones United Aircraft Engineering Corporation has been selling in the United States.

The court, after hearing arguments from attorneys for the Curtiss concern, issued an order requiring the United Aircraft Engineering Corporation to show cause why a restraining order should not be granted.

S. A. E. Summer Meeting

Plans are rapidly being completed for holding the Summer Meeting of the Society of Automotive Engineers, June 23 to 27, at Ottawa Beach, Michigan, which has been chosen because of the ideal facilities it affords for a meeting combining professional sessions with social features and recreation. One of the greatest advantages of the S. A. E. summer gathering is the opportunity for the engineers in the automotive field to become better acquainted and to exchange ideas and information.

It is planned to have the meeting include papers on all important automotive subjects general interest to warrant their presentation at a meeting of the Society. Aeronautic subjects will be treated by engineers who have made a long and intensive study of various phases of aeronautic work. A paper on engine cycles of the future is in contemplation, and it is possible that there will be papers on motorcycle design and on motor boat subjects. Representative exhibits of automotive apparatus such as seaplanes and hydroplanes used for Navy work, and high speed motor- boats used in the International Cup race, may be arranged.

N. Y. Amends Law to Permit Aero Insurance

Albany, N. Y.—Three bills amending the state insurance laws to permit marine, fire and casualty insurance companies to insure against loss or damage to aeroplanes, seaplanes, dirigibles and other aircraft have been signed by the Governor. The Governor also signed the Booth bill requiring motor trucks operating on state highways to be equipped with mirrors or some reflecting device giving drivers a view of the road in the rear.

Sell Castor Oil and Castor Beans

Washington, D. C.—The Bureau of Aircraft Production sold castor oil and castor beans, forming a surplus above the needs of the Air Service, value at $332,-927.89.



Dorothy Dalton and Pilot Zimmerman in the Aeromarine flying boat in which they flew from New York to Albany for the Victory Loan

Aeroplane Patrol in National Forests June 1

Patrol of national forests by Army aeroplanes to give early warning of fires developing in the forests will begin June 1, according to arrangements completed with the War Department by the Forest Service, United States Department of Agriculture. On the same day observations covering a large part of the Angeles National Forest will be begun from a captive balloon stationed over the Army Balloon School near Arcadia, Calif.

Two routes of aeroplanes patrol work will be operated from March Field, Riverside, Calif., and two planes will be used on each route, the routes will each be approximately 100 miles long, and each will be covered twice a day.

This will be the beginning of experimental work in which the adaptability of aircraft to forest patrol work is to be thoroughly tried out. If the tests should prove successful it is expected that the aeroplane patrols will be extended before the end of the 1919 season, and that aeroplanes will become a permanent feature of the ceaseless battle against fires in the National Forests.

The aeroplanes are not equipped with wireless telephone apparatus of such a nature that they can communicate with the ground without the installation of expensive ground instruments. Warnings of fires will be transmitted by means of parachute messages dropped over a town, the finder to telephone them to the Forest Service; by special landings made to report by telephone; and by returning to the base and reporting.

Fires will be located and reported by squares drawn on duplicate maps, one to be in the possession of each aeroplane observer and another to be in the office of the forest supervisor. A fire-fighting truck, with ten enlisted men, will act as part of the fire suppression forces, and will be subject to the call of the Forest Service.

Johns-Manville Denver Office in New Quarters

New York.—The Denver office of the H. W. Johns-Manville Co. moved from the Denver Gas & Electric Building to the Iron Building, 1021 Seventeenth Street. Louis H. Inglee remains as manager of this branch.

Ungar Becomes Vice-President of SKF Ball Bearings

New York.—G. A. Ungar, who has been engineer and technical director of the SKF Ball Bearing Co. for several years, has resigned to become vice-president of the company, of which he has been a director since its organization.

Steel Spring Piston Ring Organized

New York.—The Steel Spring Piston Ring Co. has been formed by A. J. H. Kuhsiek, formerly factory superintendent of Edward V. Hartford, Inc., and A. Meyer, formerly production manager of the same concern, to make the Bull Dog ring, a three-piece ring having several novel sales points.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative



PILOTS

Dana C. DeHart
Edward V. Gardner
Robert F. Shank
Ira O. Biffle
Leon D. Smith
Gilbert G. Budwig
Trent C. Fry

John A. Jordan, Superintendent, Western Division
Paul L. Ferron, Manager, Belmont Park
Harry W. Powers, Manager, College Park
Lowell S. Harding, Manager, Bustleton
O. J. Sproul, Manager, Chicago
W. J. McCandlass, Manager, Cleveland

PILOTS

E. Hamilton Lee
Lester F. Bishop
Carroll C. Eversole
Charles I. Stanton
John M. Miller
Max Miller
Charles E. Bradley

The Aerial Mail Service—One Year Old

In his address before the Southeastern Aeronautical Congress at Macon, Ga., today, Second Assistant Postmaster General Otto Praeger reviewed the operation of the Air Mail Service as the pioneer employment of aeroplanes for commercial service.

"When we started the aerial mail with the assistance of the army," he said, "we were told if we scored 50 per cent of the schedule trip, we ought to be satisfied, and that we might be compelled to suspend operation during at least three months in the winter."

When the first anniversary of the Air Mail Service was celebrated on the 15th of this month, the same two planes with the same motors that flew the aerial mail on May 15, a year ago, carried the mail on that day, after a year of continuous and strenuous service through sunshine, rain or gale. The Air Mail Service is a success, both in the efficiency of its flying and as a postal facility. The record of the service is more than 92 per cent of perfect, millions of letters being delivered to the people of New York on the afternoon of mailing instead of on the following morning, as would have been the case if they had gone by rail.

A total of more than 125,000 miles have been flown in every kind of weather—one in a gale of 58 miles per hour and snow storms over New York on March 28, and one in a gale of 80 miles an hour on March 29. In our total mileage, covering nearly twelve months of regular service, we have had but thirty-six forced landings, all due to mechanical trouble. We have never had a plane carrying mail drop out of the sky beyond control. We have never killed a pilot of a mail plane. There have been six cases of minor injuries, such as contusions or cut sustained in a plane turning turtle in a forced landing.

He said that to restrict aviation development and operation to a single bureau of the Government, whether civil or military, would be a blunder, and that at this formative state the Army, the Navy and the Post Office should each be provided with ample appropriations to develop commercial flying, and that the whole aviation industry should be given the amplest assistance that our Government can give.

Chicago-Cleveland Air Mail Service Shortens New York Mail Time Six Hours

Second Assistant Postmaster General Praeger, in announcing the inauguration of the Air Mail Service between Chicago and Cleveland May 15, states that this service will advance the carrier delivery of letters at Cleveland, Ohio, and Boston, Mass., by 16 hours, and at Albany, New York City, and Springfield, Mass., six hours.

At Cleveland the air mail from Chicago and western points will catch the New York Central train at 4 p.m. for the East.

Under this arrangement the air mail will be delivered in Cleveland and Boston on afternoon deliveries instead of the following morning. At Albany, New York City and Springfield, Mass., this mail will catch the morning delivery instead of the afternoon following.

Letters mailed in New York City in time for N. Y. C. train No. 19, leaving at 5:31 p.m., will reach Chicago in time for 3 o'clock afternoon deliveries by carrier instead of the following morning carrier delivery, as would be the case if sent through by train.

UNITED STATES POST OFFICE AIR MAIL SERVICE

Monthly Report of Operation and Maintenance

MARCH, 1919

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND UNIT COST: Gallon of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
														hr. min.				
2	$25.07	$1.92	$29.42	$60.81	$28.32	$111.38	$42.60	$48.13	$40.45	$58.46	$59.48	$506.04	82	3 37	248	3.02	$139.80	$2.04
3	89.69	23.23	62.37	60.81	40.33	122.92	153.53	280.29	23.60	58.46	59.48	974.71	294	13 02	872	2.97	75.00	1.12
4	15.10	.55	43.37	60.81	19.48	55.77	11.78	31.72	49.00	58.46	59.48	405.52	50	1 00	90	1.80	405.52	4.51
7	68.58	16.98	62.37	60.81	40.33	122.92	108.77	300.86	17.50	58.46	59.48	917.06	225	9 14	704	3.13	99.00	1.30
8	55.18	6.89	62.37	60.81	40.33	122.92	117.21	294.84	39.15	58.46	59.48	917.64	181	9 57	606	3.35	92.40	1.51
10	6.10	.....	32.95	60.81	12.01	44.77	.....	.....	49.10	58.46	59.48	323.68	20	.....	.....	.....	.....	.....
11	109.08	24.93	62.37	60.81	41.33	122.92	242.36	297.24	129.90	58.46	59.48	1,208.88	359	20 44	1,486	4.14	58.20	.81
12	37.22	4.28	29.42	60.81	28.32	111.38	133.51	98.39	36.75	58.46	59.48	658.02	122	11 20	722	5.92	58.20	.91
14	118.97	27.93	62.37	60.81	40.33	122.92	291.94	283.31	190.20	58.47	59.48	1,316.73	392	24 47	1,900	4.85	53.40	.69
15	157.24	32.42	62.37	60.80	39.73	122.92	375.19	303.13	71.58	58.46	59.47	1,343.31	517	31 51	2,387	4.62	42.00	.56
30	124.97	11.15	43.37	60.80	19.48	55.77	36.71	243.78	67.00	58.46	59.47	780.96	414	3 07	180	.43	250.80	4.34
38	40.18	10.30	43.37	60.80	19.48	55.77	31.81	243.78	186.45	58.46	59.47	809.87	133	2 32	218	1.64	319.80	3.71
39	92.54	17.69	62.37	60.80	40.33	122.92	97.19	262.87	24.12	58.46	59.47	898.76	304	8 15	652	2.14	109.20	1.38
43	124.56	19.80	62.37	60.80	40.33	122.92	86.98	245.14	88.40	58.46	59.47	969.23	408	7 23	433	1.06	131.40	2.24
24224	18.15	5.70	10.42	60.80	7.47	44.23	9.75	31.72	12.00	58.46	59.47	318.17	60	0 50	90	1.50	381.60	3.54
38275	33.49	4.33	29.42	60.80	28.32	107.38	20.62	33.39	272.85	58.46	59.47	708.53	111	1 45	128	1.15	405.00	5.54
39364	.....	.....	19.00	60.80	20.85	96.38	.....	46.57	5.82	58.46	59.47	367.35	.....	.....	.....	.....	.....	.....
39365	50.94	1.41	19.00	60.80	20.85	96.38	40.05	45.57	2.90	58.46	59.47	455.83	168	3 24	120	.71	133.80	3.80
Total....	$1,167.06	$209.51	$798.70	$1,094.49	$527.62	$1,762.57	$1,800.00	$3,090.73	$1,306.77	$1,052.29	$1,070.55	$13,889.29	3,840	152 48	10,835	2 82	$90.80	$1.28

Cost per mile, overhead, $.42; cost per mile, flying, $.29; cost per mile, maintenance, $.57

Note—This report includes the cost of complete overhauling of one JN-4-H and one R4-L, and rebuilding of one R4-L.

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

ABC—Report to Army Balloon School, Arcadia, Cal.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
ARV—Report to Aviation Supply Depot, Richmond, Va.
BFT—Report to Barron Field, Fort Worth, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonia, Texas.
CRI—Report to Chanute Field, Rantoul, Ill.
CWT—Report to Call Field, Wichita Falls, Tex.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
EOT—Report to Ellington Field, Oleott, Texas.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GLC—Report to Gerstner Field, Lake Charles, La.
HHM—Report to Hazelhurst Field, Mineola, L. I., N. Y.
KST—Report to Kelly Field, San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses.)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIA—Report to U. S. Naval Air Station, Miami, Fla.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PWM—Report to Payne Field, West Point, Miss.
RSD—Report to Rockwell Field, San Diego, Cal.
RWT—Report to Rich Field, Waco, Tex.
TFT—Report to Taliaferro Field, Fort Worth, Tex. (When specified in the order, the number of the field is given in parentheses.)
TMA—Report to Taylor Field, Montgomery, Ala.
UTA—Report to School of Military Aeronautics, University of Texas, Austin Tex.
WDM—Wire Director of Military Aeronautics upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in order named.

Note 2—Report to U. S. Army General Hospital, No. 22, Pihlaelphia, Pa.

Note 3—Report to Fort Mason, San Francisco, Cal., for transportation to the Philippine Islands.

Note 4—Report to Director of Air Service, Washington, D. C.

Note 5—Report to Fort Mason, San Francisco, Cal., for transportation to Monolulu, Territory of Hawaii.

Note 6—Report to Walter Reed Hospital, Tacoma Park, Washington, D. C.

Note 7—Report to General Staff, Washington, D. C., purpose of conference on Pierce Gun.

Note 8—Report to Director of Purchase, Storage & Traffic, Washington, D. C., for assignment to duty in the office of Director of Finance.

Note 9—Report to Camp Pike, Arkansas.

Note 10—Report to Speedway, Indianapolis, Ind.

Special Orders Nos. 102 to 107, Inclusive

A
Atkinson, Bert M.....Note: 6

B
Brookley, Wendell H.....Note: 3
Boudwin, Joseph Ellwood, Jr.....FLA
Fickel, John A.....MAJ
Bierman, Hugh Eastwood.....Note: 6
Burwell, Paul V.....CAP
Blackburn, Glen R.....ADT

C
Cashman, James A.....ADT
Calkins, William L.....CAP
Cheney, Moses E.....Note: 4

D
Daley, James H.....Note: 9
Doust, Horace Tyner.....HHN

E
Evans, Earl F.....Note: 3
Endler, Joseph C.....CAP

F
Freeman, Edgar W.....FLA

G
Greer, John F.....SMM
Garretson, Ray William.....CAP
Gamble, Henry Clay.....Note: 9
Gilchrist, Hugh Robert.....Note: 9

H
Hill, Edward H.....Note: 4
Hoffman, Ross. J.....HHN
Higgins, George Judson.....Note: 9
Heim, Daniel Emile.....FLA

K
Kindley, Field E.....CAP
Kennedy, Robert J.....Note: 8
Kimball, Dan A.....ADT

L
Leasure, Shelby C.....Note: 2
Little, Frederick .....HHN
Llewellyn, Frank A.....CAP
Linville, Donald.....FLA

Mc
McGaffey, Harold E.....FLA
McCown, Thomas B.....CAP

P
Pierce, Raymond C.....Note: 7
Page, Frank A.....Note 6
Phillips, William H.....Note: 4
Preston, Glenn A.....FLA

R
Robertson, George Albert Satallo, Jr.....CAP
Roth, George E.....LTC
Rossell, John E.....HHN
Roberts, Floyd Piercey.....Note: 9

S
Schofield, Aubrey W.....Note: 3
Sileo, Cavio F.....FLA
Shelby, Richard D.....CAP
Stephens, Robert G.....CAP

T
Thomas, James L.....CFT

U
Umstead, Stanley M.....Note: 9
Underhill, Ernest A.....Note: 9

Lieut. General Tso-Ting at Mineola

Lieut General Tfient Tso-Ting, of the Chinese Army, while visiting American flying fields was given his first flight at Mineola in a Curtiss aeroplane.

From Long Island to Langley

Col. Archie Miller, commanding officer Air Service Activities on Long Island, with Capt. L. G. Cleary as pilot, made a non-stop flight to Langley Field, Va., on May 10.

Navy Balloonists Obtain Meteorological Data in Ohio

Akron, Ohio, May 11.—Seven balloons took the air here late this afternoon in a drifting race to test air currents and obtain other data, held under the direction of the Navy Department. The balloons headed in a southeasterly direction.

Six of the balloons were reported passing over Alliance, 30 miles from Akron, an hour later.

Preseutation of Banners to American Air Units in France

On the afternoon of Saturday, April 12th, under the auspices of the "Pays de France" a ceremony was held at the Opera-Comique, Paris, at which banners of the organization known as the "Femmes Francaises" were presented to the American air units in France; one banner to each organization. Twenty-three balloon companies, which were serving with American troops at the front on November 11, 1918, were each presented with one of these banners; these companies are: 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 24th, 25th, 26th, 42nd, 43rd, 44th, and 69th.

Air Service Recruits to Receive Plane Ride

Colonel Rader, of Souther Field, has ordered that all men enlisting and sworn into the Air Service shall have an areoplane ride upon reporting for duty. This is to acquaint the men with flying and to assist in deciding their fitness to be pilots.

All men receiving their discharge from the Service are also to have a flight if they desire.

Air Service Officers Now Civilians

"By direction of the President, and under the provisions of Section 9, Act of Congress, May 18, 1917, and Circular No. 75, War Department 1918, the following officers are honorably discharged from the Service of the United States, for the convenience of the Government, to take effect this date, their services being no longer required."

Captains: John Gordon, Jr., George P. Sweet, William P. Field, Daniel Cushing, Philander R. Gray, George Bleistein, Jr., James W. Osgood.

First Lieutenants: William Knight, Paul N. Edwards, Howard C. Babcock, Bruce D. Reynolds, Henry M. Hoyt, Jr., Robert E. Hill, James A. Stone, Frank I. Wheeler, Jr.

Second Lieutenant: Stephen Philbin, William M. Sweet, Roy T. Robling, Preston B. Wilkes, Jr., Dean B. Fraser, Oscar R. Zipf, Emmett R. Tatnall, Paul M. Muller, William T. Wilkinson, Kenneth B. Warner, William A. Taylor, Theodore H. Sloan.

Civilian Flying Regulations

The War Department authorizes publication of the following statement from the Joint Army and Navy Board of Aeronautic Cognizance:

Before operating civilian aircraft, including aeroplanes, seaplanes and balloons, all persons must secure a license to do so from the Joint Army and Navy Board of Aeronautic Cognizance, Building D, Sixth and B Streets, Washington, D. C., according to the Presidential Proclamation, February 28, 1918.

During the parade of the 27th Division in New York City, a flying boat, piloted by an unlicensed civilian, flew up and down Fifth Avenue above the parade at a dangerously low altitude, estimated as between three and five hundred feet. In case of engine failure, the pilot could not have reached a landing place, but would have been forced to land in the crowd on the avenue. The board cautions aeroplane operators against a repetition of such an occurrence, and warns that licenses must be secured by civilian flyers.

The Army and Navy Board has control of all aircraft licenses for civilians, and points out that there is no way of adequately providing for public safety when aeroplanes fly at too low altitudes over cities or large assemblies of people. A heavy penalty is attached to violations of the regulations requiring licenses. Applications for licenses should be sent to Lieut. A. J. Clayton, Acting Secretary, Building D, Sixth and B Streets, N. W., Washington, D. C.

Artillery Adjustment by Radio Telephony

The experiment of adjustment of fire by radio telephony was recently conducted with gratifying success at the School of Fire at Fort Sill, Okla. Qualified observers though without previous radio telephone training, conducted shoots using radio telephony instead of the radio telegraphy with gun crews also untrained in this new method.

On April 22 one observer adjusted two guns on a two-gun emplacement in 28 minutes from the time the plane left the ground until the end of the problem. his was the first time he had ever conducted a problem from the air with the radio telephone, having bothway communication direct with the battery, and the gun crews were also new. It is believed that with trained personnel a precision adjustment can be accomplished in twenty minutes, or a zone adjustment in three or four minutes.

The rapidity with which sighting can be accomplished by radio telephone is due to the high speed of transmission. Radio telegraph is limited to sixty characters a minute.

New R. M. A.'s

The following-named officers, having completed the required tests, are rated as Reserve Military Aviators, to be effective from the dates set after their respective names:

Captain Louis R. Crawford, A. S. A., March 29, 1919.
Captain William G. Renwick, A. S. A., March 29, 1919.
First Lieutenant Ward R. Clark, Infantry, March 29, 1919.
First Lieutenant James C. Nabours, A. S. A., March 29, 1919.
First Lieutenant Clarence J. Moors, A. S. A., March 29, 1919.
Captain Paul R. Turpin, A. S. A., March 29, 1919.
First Lieutenant George E. King, A. S. A., March 6, 1919.
Second Lieutenant Howard C. McGregor, A. S. A., March 6, 1919.
Second Lieutenant Roy W. Chilson, A. S. A., March 6, 1919.
Second Lieutenant Henry C. Gamble, A. S. A., March 6, 1919.
Second Lieutenant John F. Dresing, Jr., A. S. A., March 10, 1919.
Second Lieutenant James A. B. Roddie, A. S. A., March 10, 1919.
Second Lieutenant John Wilson Albright, A. S. A., March 25, 1919.
Second Lieutenant Ralph J. Leeds, A. S. A., March 29, 1919.
Second Lieutenant Lester N. Stockard, A. S. A., March 29, 1919.
Second Lieutenant Woodward C. Riley, A. S. A., March 29, 1919.
Second Lieutenant William D. Jones, A. S. A., March 29, 1919.

Ten Fields To Be Abandoned

The War Department has decided to abandon the following flying fields:

Barron Field, Ft. Worth, Texas,
Call Field, Wichita Falls, Texas,
Carruthers Field, Ft. Worth, Texas,
Eberts Field, Lonoke, Arkansas,
Love Field, Dallas, Texas,
Payne Field, West Point, Miss.
Richfield, Waco, Texas.
Taliaferro Field, Ft. Worth, Texas,
Taylor Field, Montgomery, Ala.,
Gerstner Field, Lake Charles, La.,

as soon as equipment now in storage at these fields can be disposed of.

The abondonment of Gerstner Field will be completed by June 30, 1919. It is intended to sell or salvage the buildings and improvements unless they can be utilized to advantage by some other department of the Government.

The War Department has requested information from these other departments as to whether they desire to make use of any of these fields, and, if so, that further details will be supplied by the Construction Demobilization Committee of the General Staff.

Souther Field Notes

Major Tom C. Macaulay who holds the transcontinental records will probably be in command of the squadron using seven De Haviland fours 400 horsepower Liberty Motors in the flight from Dallas, Texas, to Boston, Mass.



A Caproni biplane, built entirely by the American workmen shown in the photograph, was built at the Caproni factory at Milan. The civilian in the center is Gianni Caproni

FOREIGN NEWS

New British Airship

Vickers, Ltd., of London, has announced the approaching completion of the R-80, a new rigid airship, which it is believed will fly the Atlantic with ease. It is expected that the machine will be ready for trials in May. It has been designed entirely by Vickers. The ship has bow-mooring attachments that will permit it to be moored out from a tower in such a manner that it can turn in any direction and lie with the wind. Four cars are attached to the hull—a forward control car and machinery car, and two wing cars for machinery fitted on opposite sides of the ship. Thee are four Wolseley-Maybach engines of 240 nominal brake horsepower each. The airship will carry a crew of sixteen and will have accommodation for a good number of passengers.

Australia to Have Air Service

The Australian government has completed a plan for aerial defense and proposes to establish aviation schools with squadrons of aeroplanes, seaplanes, and airships, according to an Associated Press dispatch from Melbourne on April 21. The peronnel will number 1,400 men. The initial expenditure will be $2,500,000 and the annual expenditure thereafter $2,500,000.

A Flight from Brussels to Peace Session

Paul Hymans, Belgian Foreign Minister, recently made a flight to the Peace Session, leaving Brussels at 1 P. M. and arriving in Paris at 2 P. M. in time to attend the plenary session.

Aeroplane Carrying Twenty-Five Goes Up More Than Three Miles

The giant Farman Goliath, which has been flying between Paris and Brussels, ascended to a height of 5,100 metres (approximately 16,732 feet) while carrying twenty-five passengers. The ascent was made in one hour and fifteen minutes and the descent in twenty-five minutes.

British Plan for Air Mails

The British press generally asserts that the commercial development of the aeroplane is much further advanced in Great Britain than in any other country. According to the American Chamber of Commerce in London, a mail service from Cairo to India is to be inaugurated. The air route already has been surveyed and a route from Cairo to the Cape of Good Hope is being laid out.

Aerodromes are to be established at suitable spots in the British Isles and British possessions and equipped with sound and light signals, balloons, aerial buoys and wireless telegraph and telephone outfits.

"Already cargo aeroplanes are in sight," the Chamber of Commerce announces. "A huge British seaplane of novel type, equipped with five motors, has been flown, carrying six tons, at 100 miles an hour. Experiments are being made with another having a carrying capacity of nine tons."

London Flying Club

To the tremendous attention now being given to aviation for various commercial and governmental purposes in England, it is interesting to note that the social features are not being overlooked. A social aviation club is under construction not far from London covering an area of 30,000 square feet and which will contain eighty bedrooms.

The club is the London Flying Club at Hendon. It is rapidly nearing completion, and will be the largest, if not best appointed club, in the world devoted to the problems and sport of air flying. The main salon will be a hall 130 by 80 feet and will be used not only for social affairs, but for lectures with moving pictures of aeroplane progress. Annual dues for the first five hundred members have been fixed at ten guineas for men and seven guineas for women, with no entrance fee. Members will be able to hire machines at reduced rates.

Germans Planned Using All Metal Aeroplane

The Germans never had a chance to use their latest aero creation on the front against the Entente airmen—the entirely metal plane.

The metal plane was made of aluminum, body, wing struts and all. The most recent development included metal wings, except the edges, which have to be flexible for guiding the plane. The metal plane was almost bulletproof, except direct hits, and came as near being an armored plane as any developed.

In the Zeppelin factory at Staalen are almost a hundred of these planes nearly finished, most of them without wings. They are bright and shiny aluminum and are the most deadly looking machines imaginable.

The aluminum plane had been tested very carefully in the rear and at the factory and was found entirely satisfactory. It was as fast and almost as light as the planes made of wood.

Chile's Interest in Aviation

General A. Pinto, Chief Staff of the Chilean Army, and Capt. C. Garfias, are touring the world inspecting the various aviation fields. They have been at Hazelhurst Field, Mineola, accompanied by Col. A. Ewing, Military Attache of Chile in the United States. General Pinto established the Chilean Flying School in 1913.

The Aeroplane for Colonial Trade

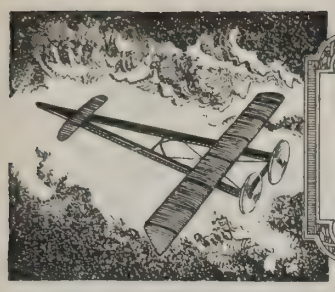
In the adaptation of the aeroplane to commercial requirements the wearing capacity of all its parts becomes of prime importance. It is in some of the lesser developed lands where communications are still poor that we may look for a rapid adoption of aerial transport; and it is just these climates, featured by tropical heat or northern cold, that may have a detrimental effect on the aeroplane constructed principally of wood. The possible ravages of the ant alone merit consideration. It is to cope with this that The British & Colonial Aeroplane Co., Ltd., of Milton, Bristol, England, have evolved a biplane of all-metal construction. The fuselage is a special construction of aluminum and steel, in sections which can readily be dismantled for transport. The struts are of high tensile steel throughout, the wings are made of aluminum and high tensile steel. The performances with a comparatively low-powered engine (180 h.p. Hispano Suiza) have proved that the all-metal construction does not adversely affect its speed or rate of climb, while the weight (1700 lbs. with engine) compares very favorably with that of a wood-built machine. When loaded it can carry 450 pounds of cargo. At ground level it has a speed of 110 miles per hour, can climb 5,000 feet in eight minutes and has a landing speed of forty-seven miles per hour.

The Up-to-date English Movies

In the speedily developed cinema industry, one of the most knotty questions the film producer and distributor has to face, is that of delay and uncertainty in the delivery of films from one area to another. The producers of the film, "Power of Right," in which the Prince of Wales plays a part, have already decided that the aerial route is the solution of the difficulty. Through the Air Ministry they have had a "Bristol" Fighter Aeroplane, piloted by Capt. West, R. A. F., placed at their disposal.



A 1915-1916 Nieuport Fighting Scout



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



Model Aeroplane Contests

The contests to start June 1 will consist of the following events:

Hand launched for distance.

Three individual prizes will be given for this contest; that is, a first, second, and third prize.

The Villard Cup, which has been won two times by the Illinois Model Aero Club, will be offered again to the club making the best showing as a team. This cup was donated by Mr. Henry Villard, of the Aero Club of America, and was to be the property of the club winning it three times. The Illinois Club has two legs on it, and if they win it again it is their property.

R. O. G. contest for distance.

Three prizes will be given in this event.

Construction contest for scale models. Only one prize will be offered for this contest, and will be exceptionally good.

Prizes have not been decided on as yet, but you can rest assured they will be best ever offered for Model Aeroplane Contests.

The rules for conducting these flights are simply that they must be witnessed by at least three prominent men, or if there is a branch of the Aero Club of America in your city, invite some of these men to witness the flights.

A contest is not official where there are less than five contestants. It is not necessary for all the contestants of one club to live in same town. A model flyer living in one town can compete with a club having its address in another town.

The construction contest will be decided by sending in photos of the model to this office. (Only clear photos will be accepted.) A description of the model must accompany the photograph.

If these events are well attended, it is our idea to run more contests later in the year.

Description of the prizes will be given in next issue of AERIAL AGE.

The Dowd R. O. G. Model

The model shown in the accompanying drawing is interesting, inasmuch as it is somewhat on the plan of the Efficiency model drawn in the last issue of AERIAL AGE, both having a true wing section and the rubber motors running inside the covered or hollow "A" frame spars.

This is not a late model, as it was built in 1916 by Raymond E. Dowd, but the design is so well worked out that it is in line with the present-day models. Features of the model are the large span of the main plane and the non-lifting tail with the main plane in front.

Its appearance is different from from the average pusher type, and it would be well for model builders to take into consideration a few of the interesting features when designing models for coming contests.

The main plane has an aspect ratio of about 7, the span being 41½ inches and the chord 6 inches, giving a surface area of about 1.7 square feet. The wing profile is the Eiffel No. 32, covered both sides with thin paper and set at an angle of 6° with the frame or fuselage. The entering edge is made to conform to the shape of the wing section. The trailing edge is very thin and inserted into the ends of the ribs. The ribs are cut to the Eiffel No. 32 section, but flattened in front to butt against the entering edge and and drilled to decrease weight. The plane is then attached to the frame members with dress snaps. Two streamline plane-hangars hold the plane securely.

The tail plane is of the non-lifting type, and has a surface area of about ¼ square foot. It is built around the cross braces of the frame and has one rib in the center.

The propellers, two in number, are 12 inches in diameter and have a 20-inch pitch. They are readily detached from the hooks by removing a pin which passes through a hole drilled in a slightly flattened section of the shaft, which is 3/64-inch brass spring wire. They are driven by fourteen strands of ⅛-inch flat rubber, which gives a propeller speed of 800 R.P.M. and a slight increase in dynamical speed.

The keel surfaces, two in number, are set at the extreme front and rear of the model, the smaller one in front and the larger in the rear, built in with the non-lifting tail plane.

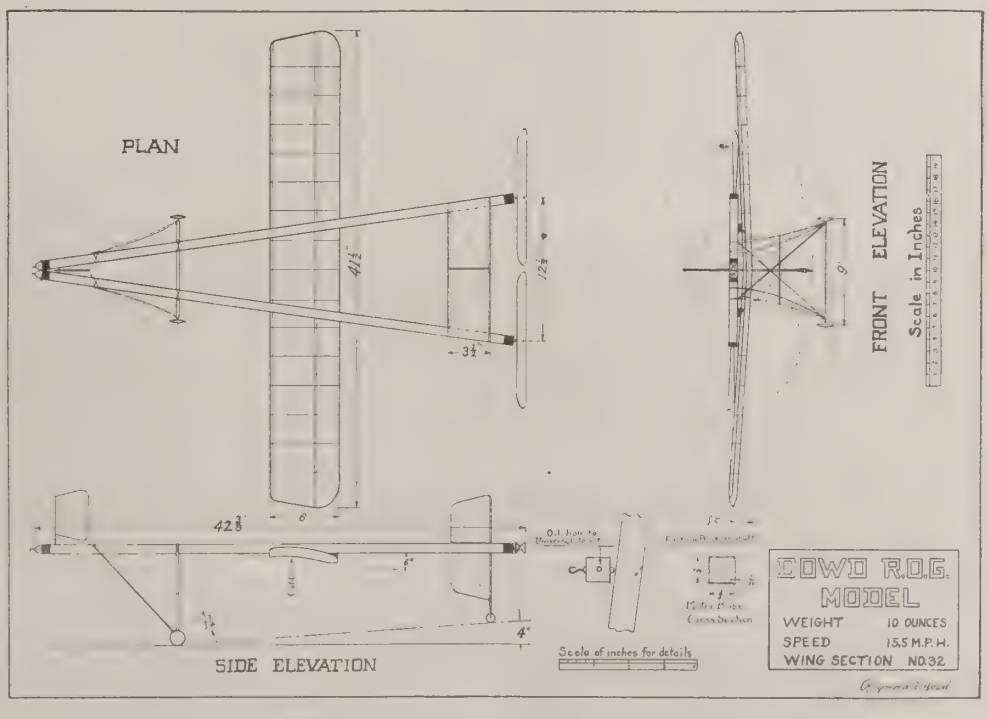
The forward fin is adjustable for steering, and is held on a mast set in the triangular block at the front of the fuselage. This fin, although not inclined in the original design, was found necessary to prevent the model from spiralling.

The landing gear, so fashioned to hold the model at an angle of 4° when resting on the ground, is made of ash members for the pieces under compression and of bamboo where they are in tension. These parts are then streamlined and fastened with thread and glue.

The wheels are cut from pine and are 1¼ inches in diameter. The rear wheel is ¾ inch, and is held in a fork of brass wire on the extension of the rear keel. It is cross-braced with fine wire and can withstand the severest shocks.

For the bearings, the rubber is held at the forward and on wire hooks passing through streamline blocks where they are formed into hooks for attachment to the winder. A pin through this wire prevents it from turning in the blocks.

When starting on a flight the model rises from the ground after a short run, all the wheels getting off together. It climbs steadily without stalling as its fiying angle is only 4° less than its angle when resting on the ground. The flight is firm and steady, owing to the high degree of inherent stability contained in the Eiffel No. 32 wing section. As a result of the careful elimination of head resistance the model attains a flight speed of over 15 miles an hour. The total weight is 10 ounces, which means that the model carries over ¼ pound to the square foot, considerably over the average for rubber-driven models of the flling stick type. The average length of flight is slightly under 1,000 feet with a duration of one minute from 800 turns of the propellers.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Plea

(From an Aviation Inspection Department)

We answer countless calls a day
Upon our phones—cause for dejection;
The tenor is in much this way:
"Fix it, Inspection."

A tail skid's missing or a wing
Is so we've really to correct it;
Diurnal memorandums bring
"Plane"—dash—"inspect it!"

It flatters us more ways than one
To note in such and such connection
The thoughtful things forever done
For our inspection.

And we would but one kick inflict
From out a rather large collection
Upon our friends—why so restrict
Us in Inspection?

We'd love examining the lines
Of those of feminine inflection—
When you're with Sue, May, Rose, betimes,
Phone "6," Inspection.

Sgt. Roy Harris Russ.

For Real Estate Agents

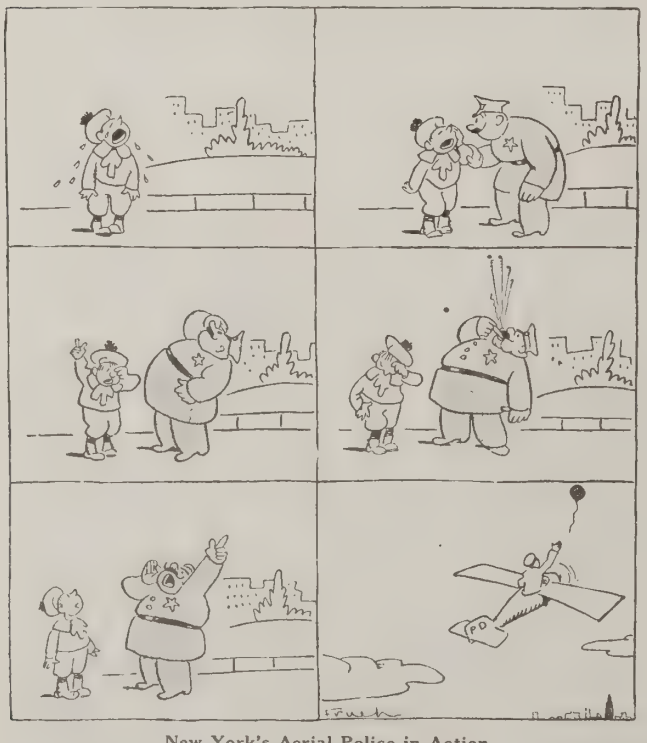
An old joke in a new setting:

Aviator: "I say, sir, that confounded land you let to me is badly drained. My aeroplane hangar has a foot of water in it."

"Indeed."

"Yes, a pool of water, sir. What do you suggest?"

Landlord: "I suggest you keep a seaplane."



New York's Aerial Police in Action

—From the N. Y. World.

Precocious

Fond Mother: "And do you know, dear, baby is always interested in aeroplanes. Every time he hears one he says 'Goo!'"

Baby: "Goo goo!"

Mother: "The little darling. And look, dearest, the little man's quite right—there are two of them."

A Rigger Inspector's Lament

For years it seems I've tightened wires
And added wind to rubber tires,
Fixed the stagger, stabilizer,
(Death's respects to an ex-kaiser)
Worked like fury on turnbuckles,
Longerons and scraped my knuckles;
Lord, I wonder when I go
To Heavenly rest will it be so
That e'en the angels fly wing low?

Sgt. Roy Harris Russ.

Revised Editions of General Orders Issued

The reversed set of general orders for the armed forces of the United States following has been appearing in several of the aviation newspapers, and is said to have been first published by the Fort Omaha Gas Bag:

1. To accept my discharge, take charge of all government property in view and beat it home.

2. To accept my discharge in a military manner, keeping always on the alert and observing that it will not be revoked before I get out of sight.

3. To take the quickest train and not stop at any military post on my way.

4. To repeat all dope and rumor which has been spread through buildings closer to headquarters than my own.

5. To receive, believe and pass on to my children the experience I have acquired while in the service, or shall acquire in the future.

6. Not to again quit civilian life after being properly discharged from the service.

7. To talk to no one about re-enlisting.

8. In case of the presence of a recruiting officer to give the alarm.

9. When the girls are home to allow no soldiers or militia on or near my premises.

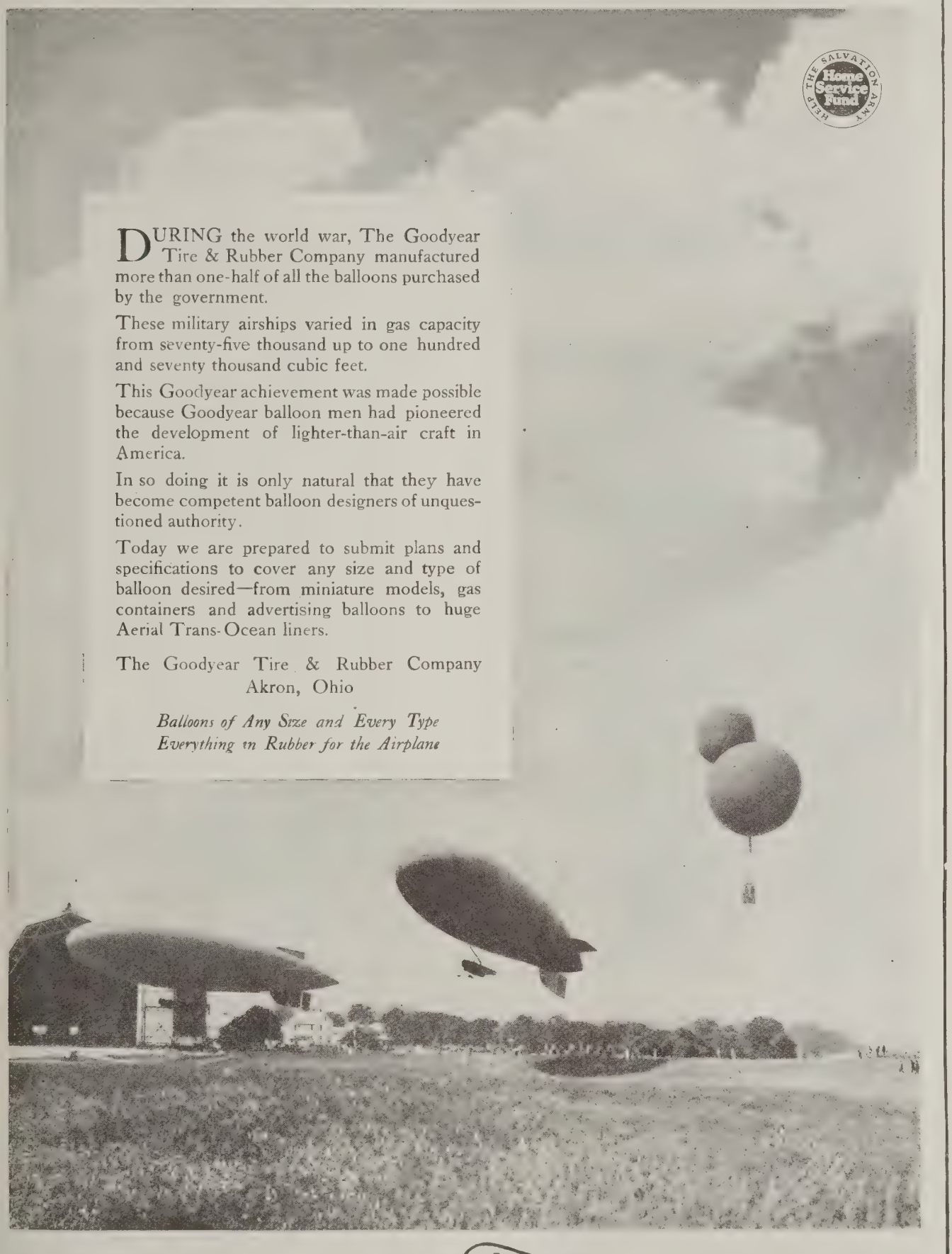
10. In all cases not covered by instructions to claim exemption.

11. To salute all officers who have aided me in getting my discharge and all the Budweiser and whiskey now cased.

12. To be especially watchful at night, and allow no one to pass without buying a drink.

—By Order of General Nuisance.

"Ex-Lieutenant" writes to the editor of the *Army and Navy Journal:* "Having at last resumed my normal habitat and clothing, and feeling, therefore, extraordinarily irresponsible, mentally, and peculiarly loose from the knees down, I beg to offer the following suggestion for service in foreign territory: For each period of six months' continuous active service in the state of Texas, one chevron of salmon pink, a cactus rampant and a mule couchant embroidered thereon, the same to be worn over the right lung, or as near thereto as the conformation of the blouse permits."



DURING the world war, The Goodyear Tire & Rubber Company manufactured more than one-half of all the balloons purchased by the government.

These military airships varied in gas capacity from seventy-five thousand up to one hundred and seventy thousand cubic feet.

This Goodyear achievement was made possible because Goodyear balloon men had pioneered the development of lighter-than-air craft in America.

In so doing it is only natural that they have become competent balloon designers of unquestioned authority.

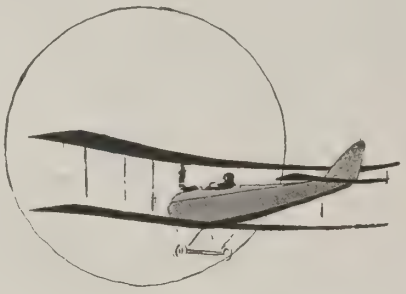
Today we are prepared to submit plans and specifications to cover any size and type of balloon desired—from miniature models, gas containers and advertising balloons to huge Aerial Trans-Ocean liners.

The Goodyear Tire & Rubber Company
Akron, Ohio

Balloons of Any Size and Every Type
Everything in Rubber for the Airplane

GOODYEAR
AKRON

"Come along and Fly, you don't need to be afraid, for we will insure you. Don't miss the experience. It will make your trip to Atlantic City worth while."



The Aero Protective Assn.

(Incorporated)

"We have the altitude record for service in the insurance field"

AND

Payne & Richardson

Incorporated

"Better be safe than Sorry"

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Bridgeport, Conn., 325 Meigs Bldg.

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We write all lines of insurance on AEROPLANES, SEAPLANES, DIRIGIBLES, KITES, FREE BALLOONS, etc.

Compensation, public liability, property damage, accident and life insurance on passengers. Fire, theft, burglary and collision.

No matter what you want to insure come to us.

We make a specialty of AUTOMOBILE policies.

All officers and directors are ex-service men

Charles H. Payne, Ensign Naval Aviation; J. W. Moore Richardson, 1st Lieut. U. S. Inf.; Major Baldwin; Major Landis; Granville A. Pollock, Capt. U. S. Air Service; S. Herbert Mapes, Capt. U. S. Air Service; William Menkel, Capt. U. S. Air Service.

Disposition of Motors

Among the special problems which have arisen during the war is that of obtaining sufficient horse power to drive the large bomb carrying planes called Bombers. These aeroplanes weighing from seven to ten tons loaded required from 800 to 1200 horse power.

No power plant of more than 400 h.p. has been available so two or more power units have been required to drive the Bombers.

These motors have been mounted in the cellule on a special truss erected on either side of the fuselage and at sufficient distance from it to permit propeller clearance. This method of placing the motor has many serious and even dangerous features and requires engine bed supports trussed out into the open space ahead of the leading edge of upper and lower wings in order that the center of gravity of the motors may form a portion of the forward gravity moment arm of the Bomber.

There are several other arrangements, which involve considerable experiment and I have listed below the respective advantages of two of these plans.

1. Bevel Gear Transmission Drive	1. Direct Reduction Drive
A. Two motors compactly located within the fuselage, where they do not create the dangerous inertia moment due to placing motors in the cellule.	Both Motors located within a fuselage on common engine bed, which includes bearings for single propeller shaft reduction drive.
B. Complete failure of either motor leaves efficiency of Bomber unimpaired, since:	Same
1. Either motor will drive both tractor screws.	1. Either motor will drive the single tractor screw.
2. Either Sunbeam 300 h.p. motor will drive plane 74 m.p.h. with 2 ton useful load. (Refers to Martin Cruising Bomber.)	2. Either Liberty 400 h.p. motor will drive plane 81 m.p.h. (Refer to M.C.B.)
C. Motors are conveniently located for repairs as contrasted with their present inaccessible location in exposed portion of cellule.	Same
D. Safety and dependability of Bomber are considerably increased due to	Same
1. Independent transmission support, for	
a. Propeller breakage will not endanger cellule truss as it does in existing two motor machine.	Same
2. Cellule stresses are less and more accurately calculable than they are when motors are located in the cellule.	Same
3. Bomber in spite of its large size can be manoeuvred with the same facility as single-motored planes, for,	Same
a. Motor weights are similarly disposed within fuselage.	
E. Transmission system decreases structural resistance, in that,	Same
1. Fuselage is no more resistance than that of the present two-motored planes and no motor housing is required in exposed portion of cellule.	Same
F. Protection from fire.	Same
1. The compact placement of the two motors makes the protection of that portion of fuselage by steel armour plate a comparatively simple matter adapting this type as a Trench Fighter.	Same
G. Motors form important part of gravity moment arm, for	
1. Motors are located forward of plane of tractor screw rotation, as a consequence.	1. Motors are located forward of leading edge of aerofoil.
a. Length of fuselage forward of cellule can be shortened over present two-motored design.	Same
H. The gear ratio permits the attainment of the most efficient propeller revolution ratio, also that of motors.	Same
Advantages of Direct reduction Drive as compared with Zeppelin Type transmission.	Disadvantage of Direct reduction drive as compared with Zeppelin type transmission.
Simplification Weight reduction Dependability Reduction of Structural Resistance Less mechanical loss of power	Loss of Revolving shell gun placement, Increase of fuselage skin friction.

EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

THE EVOLUTION OF MARTIN AEROPLANES



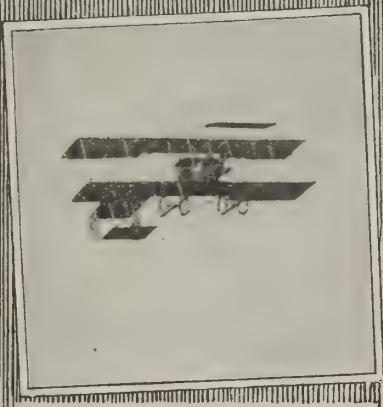
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QUEEN-MARTIN THE FIRST TRACTOR BIPLANE IN AMERICA DESIGNED, BUILT AND FLOWN BY JAS. VERNON MARTIN 1911 SPEED 72 MILES PER HOUR.



MARTIN TRACTOR THE FIRST AEROPLANE IN ALASKA-DESIGNED, BUILT AND FLOWN BY MARTIN 1912.



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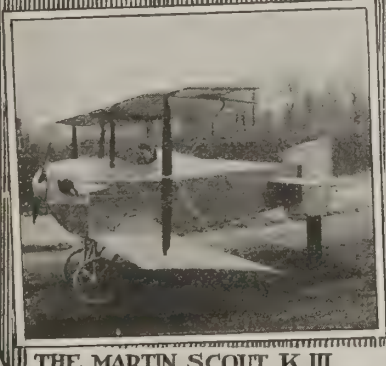


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THE MARTIN CRUISING BOMBER DESIGNED AND BUILT BY MARTIN 1916



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THE LIBERTY RECONNOISSANCE FIGHTER DESIGNED 1918 FOR U.S. WAR DEPT. BY MARTIN IN COLLABORATION WITH THE LEADING DESIGNERS OF ENGLAND AND FRANCE.

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Shock Absorbing Rudder
Shock Absorbing Pontoon Supports

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EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS



Letters of (another) Self-Made Merchant to His Son

With Apologies to Mr. George Horace Lorimer

Loneyville. Ill.
May 4th 1919

My dear Son

You sure have got your old dad going and mom too. I always said you had something in you but did not want to get your young head all swelled up by telling you so.

Your advertisement has been cut out of the "Bugle" and been put up at the railroad depot and outside the Post office. I mean that part of it that says SPECIAL ORDERS DELIVERED BY AIRPLANE (WITHIN 75 MILES RADIUS OF OUR STORE) WITHIN ONE HOUR OF RECEIPT OF ORDER. Everybody talking about it.

It looks good to me. John, real good. This quiet old burg is all wrought up and you will get a big bunch of orders and a bigger advertisement believe me.

So you are bringing Edith and the boy over Sunday a.m. in your busy Bellanca as you call it. Better get here after church is in this time as the collection was mighty slim last. Deacon Grouch kicked.

Mom and I send our best to you all.

Your affect Father
Ezra Smith

P.S. Suppose you got your name painted big under the wings and the long narrow part.

"The Aeroplane for Everyman"

The Design, Construction and Performance
OF THE
BELLANCA, C.E. TWO-SEATER
Meet Every Demand of Aerial Enterprise

The "BELLANCA" Detachable Pontoons
Solve the Problem of the Itinerant Passenger Carrier and the Shore Resort Vacationist
Who Desires to Include His 'Bus in His Baggage

Specifications and all information:
HARRY E. TUDOR Sales Manager **299 Madison Ave., N. Y. City**

(*Continued from page* 493)

The third gear box is of a special reduction type, in which two pinions are used, both engaging with one common spur wheel attached to the propeller. This is fitted to the after car, which is of larger dimensions than the others and carries two engines. All gear boxes are of similar detail design, the gear wheels being of large diameter, case hardened, and are fitted with pumps so arranged as to ensure a constant supply of lubrication to the teeth and bearings, etc.

Small tanks are supplied containing the supply of oil for the gear boxes, and are fitted to the cars near the gear boxes.

The radiators are coupled by aluminum piping to the engines and to an aluminum tank arranged in the hull of the ship.

Special arrangements are made to enable the effective cooling of the radiator to be adjusted to suit the temperature of the surrounding air and the speed of the engines. Branch pipes are supplied for heating when on the ground and supplying cold water for stationary trials.

The fuel leads fitted by the builders of the ships were connected by the Sunbeam Company to filters and petrol cocks on the gondolas, the filters, etc., being duplicated so as to enable them to be cleaned while the machinery is in motion.

In addition to the usual lubrication fittings supplied with the engine, special oil cooling tanks placed outside the gondolas are fitted, which are in direct communication with the oil circuit on the engines through a series of connections made with oil cocks fitted with indicating plates so that the amount of oil passing the coolers can be adjusted to suit the running and temperature conditions, and a fresh supply added to the oil in circulation from a tank situated in the main structure of the ship.

The oil circuit also incorporates a special filter so arranged that one half of the filter is continually in use while the other half is taken apart for cleaning purposes.

In addition, the work of the Sunbeam Company includes the erection of all these parts, and the carrying of the whole of the machinery through the initial trials which included air-borne trials in the shed, and flight trials of eight hours duration. The whole of the machinery is designed by the Sunbeam Company, the general arrangement of the gear being from data supplied by the Admiralty.

The two bladed propellers are also manufactured by the Company, and those propellers, one of which is 19 feet 6 inches in diameter, were all tested by the Admiralty on a special rotary apparatus before being placed on the ships.

(*Continued from page* 485)

wind three miles an hour, flying 222 miles at the end of the first three hours. The next three hour period would find them with a wind directly on their tails, going at a speed of 70.5 miles, raised to 100 miles an hour by the wind. The sixth hour would thus find them 522 miles out. From that point on the winds would be favorable. Making from 99 to 95 miles an hour, the aeroplanes would swing slightly to the southeast for the first nine hours, and would then change to an almost due east course to take advantage of changing winds, swinging again to the southeast at the fifteenth hour of flight. Flying this course they would arrive at the Azores."

It would be possible, Mr. Curtiss pointed out, for the flyers to steer directly for the Azores, allowing for drift. This would not be as economical a procedure as the one just described, but might be preferred on account of its simplicity. If there were no winds at all, or contrary winds, the trip to the Azores would be one of thirty hours or more, as the speed of from 71 to 61 miles an hour would require that length of time for the flight.

Margin of Safety

As the Azores route follows for a considerable distance the course of trans-Atlantic steamers going from the United States to Europe, or from Europe to the United States, these will join with the Government destroyers on duty in eliminating any chances of disaster to the flying crews. It is not prboable, however, that these vessels will have an opportunity to practice life-saving. The N-C boats, if forced to descend, can ride a fairly high sea. Repairs made, they can ascend again. But even the possibility of their descending is remote. Of the four motors which each "ship" mounts, one will always be in reserve, and after the first fourteen hours, two will be in reserve. It is scarcely probable that with the quality of engines used and the expert care given them any difficulty necessitating descent will arise.

Gasoline, another important element, had in Mr. Curtiss's opinion been adequately provided for.

"For a twenty-hour flight such as that described above, about 8,000 lbs. of gas would be required. A thirty-hour flight, with consumption lessening as the motor power required is less, would need 11,000 lbs. This, I should estimate, will be the capacity of the N-C planes, and in case unfavorable winds prevail, a stop will be made at Flores instead of at San Miguel, and a saving made of almost five hundred miles. In any case the supply of gasoline will be ample."

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Our Freighter and 12-Passenger
Airplane soon to be announced

THE GLENN L. MARTIN COMPANY
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THOMAS-MORSE

Side-by-Side Seater, Type S-7

Equipped with 80 h. p. Le Rhone Engine.

High speed, 90 M. P. H.

Landing speed, 35 M. P. H.

Climb 6,700 ft. in first ten minutes.

THOMAS-MORSE AIRCRAFT CORPORATION

ITHACA, N.Y. U.S.A.

(*Continued from page* 480)

largest 'blimp' of the United States Navy has a hydrogen capacity of 180,000 cubic feet, the British have constructed airships of over 2,000,000 cubic feet of capacity.

The speaker also announced that it is known that Great Britain has designs completed and even now under construction, dirigibles of from five to ten million feet capacity, capable of skooting through the heavens at a greater speed than 100 miles an hour and that the great leviathans of the air are capable of round-trip, non-stop flights across the Atlantic. Basing his opinion on observations he has just made in the industry in Europe and this country, Mr. Upson predicted that trans-Atlantic dirigible traffic would be so common within the span of another year that the air-liner constructors would be working on ships for round-the-world flights.

Regulations for Airways Discussed

The convention on the evening of May 15 took up the problem in its application to the United States and Canada, proposing regulations which delegates believe will both safeguard and popularize aerial traffic. As defined in the "dictionary" of the regulations the term "airways" is used to designate all transcontinental or coastal air lines, while the connecting links are known as "air routes." The regulations declare:

"An airway is a belt eighty miles wide. All cities and communities located within this belt are designated as being on the airway. An aviator flying on a clear day can see forty miles each side of his machine, and it is desirable to have the airway as wide as the aviator's range of vision."

The proposed regulations to govern air traffic provide: That aircraft navigating between points less than 500 miles apart shall not go over the 5,000 feet altitude level; aircraft navigating between points from 500 miles to 1,000 miles apart shall travel at a height of between 5,000 and 10,000 feet; aircraft navigating between points 1,000 miles apart or over shall travel at heights of not less than 10,000 feet.

Dividing air travel into different levels, it was argued, will prevent accidents due to loss of altitude in flight. Some delegates, however, contended that such traffic regulations would be impossible of enforcement.

The regulations also provide that to guard against accidents due to drifting in fogs and darkness the airways are to be eighty miles wide. The aircraft will travel to the right side of the centre of the airway until they approach their destinations. Each airway becomes, therefore, divided into two "one way streets" thirty miles wide, respectively. The ten mile belt in the centre is a neutral-safety zone.

The American airways are the Wilson airway, extending from New York to San Francisco; the Wright Brothers, extending from Washington, D. C., to San Diego, Cal.; the Langley airway, named after Professor Samuel Pierrepont Langley, the pioneer experimenter in aeronautics, extending from Philadelphia to Santa Barbara, Cal.; the Chanute and Bell airway, named after the experimenters in aviation, Octavo Chanute and Alexander Graham Bell, extending from Boston to Seattle and Portland, Ore., and the Rodgers airway, named for Galbraith Perry Rodgers, first transcontinental flyer, extending from Newport News, Va., to Los Angeles, Cal.

Those running along the coast are: The Atlantic airway, extending from Bangor Me., to Key West, Fla.; the Gulf airway, extending from Key West to the mouth of the Rio Grande, and the Pacific airway, extending from San Diego to Puget Sound.

There are two Canadian airways:—The "All Red" airway will extend from St. John's, N. F., gateway of the trans-atlantic air route, to Vancouver, the gateway of the Pacific; the "Sunset" airway will extend from St. Johns to Prince Rupert, on the Pacific.

The various airways were shown on a large map which has just been completed and was displayed publicly for the first time.

Mrs. May Brown Dietrich, of New York, qualified on the afternoon of May 13 as the first woman golfer to fly to the links from the Atlantic City beach. Aboard "Eddie" Stinson's aeroplane, she left the strand in front of the Hotel Traymore at two o'clock and eight minutes later was at the Sea View Country Club clubhouse, ready for a game of golf. A large white sheet has been spread out near the clubhouse by the management as the "range finder" for aviators. The success of the golf-taxi exploit has made a hit with the golfers, who are booking engagements ahead for the eight mile run to the greens.

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AERIAL AGE WEEKLY

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The New York-Philadelphia-Washington Mailplane En Route

Important International Aeronautic Authorities in Attendance at Second Pan-American Aeronautic Convention

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VOL. IX NEW YORK, MAY 26, 1919 NO. 11

IMPORTANT INTERNATIONAL AERONAUTIC AUTHORITIES IN ATTENDANCE AT SECOND PAN-AMERICAN AERONAUTIC CONVENTION

Who Has Aeroplanes for Sale?

NOT less than a hundred people, including aviators, college men, representatives of different countries, sportsmen and sportswomen, are asking this question.

It seems preposterous that the aeroplane manufacturers are unable to make deliveries, but such is the case. Large firms with large output are sold out until the middle of the summer, and orders are piling up faster than machines can be produced.

This is another evidence of the invaluable work done by the Second Pan-American Aeronautic Exposition held at Atlantic City during the month of May. The usual daily discussion of the possibilities of employing aircraft for different purposes coupled with the enthusiasm and interest created by the Aerial Races have resulted in hundreds of people wanting to use aeroplanes for pleasure, sport, and utilitarian purposes.

As the Collegiate Races and other contests and events are to be held weekly throughout the summer at the Atlantic City Air Port, and over a million people visit Atlantic City each month throughout the summer, the demand for aeroplanes will, undoubtedly, assume very large proportions. Let us hope that the manufacturers will be in a position to supply the demands.

Among the exceptional scientific papers presented to the Convention during the past week were remarkable papers by Colonel E. Lester Jones, Director of the Coast and Geodetic Survey, on "The Aeroplane in Surveying and Mapping," and by Lawrence B. Sperry on "Scientific Instruments for Aerial Navigation." These papers will be presented in forthcoming issues of AERIAL AGE.

Luncheon in Honor of General Guglielmotti

A delegation of distinguished visitors, including representatives of seven different nations, guests at a luncheon given in honor of Gen. Amelio Guglielmotti, Italian Military Attaché, by officials of the Second Pan-American Aeronautical Convention, rose to their feet and cheered for several minutes when President Alan R. Hawley, of the Aero Club of America, read a message ainnouncing the safe arrival of the NC-4 at the Azores. It was the chief feature of the dinner given in the submarine grill at the Traymore.

"I wish to extend my congratulations to your great Navy," declared Gen. Guglielmotti, when he had been introduced. "Two months ago at the annual dinner of the Aero Club of America I expressed the wish that Americans would be the first to fly across the Atlantic and now I am very



One of the many official affairs held at Atlantic City, in connection with the Second Pan-American Aeronautic Convention and Exposition. Present at this affair were: Brig.-Gen. L. E. O. Charlton, C.B., C.M.G., D.S.O.; General Collardet, French High Commission; Col. T. E. Gilmore, Asst. British Attaché; Capitaine Pierre Bosc, French Mission; Mr. Alan R. Hawley, President, Aero Club of America; Mr. Augustus Post, Mr. Henry Woodhouse and many other notables

glad to say my wish has been fully accomplished. The regular flying of ships overseas will enable the nations of the world to know and love one another better."

The guests at the luncheon included:

General Emilio Guglielmotti, Italian Military Attaché; Captain Carlo Tappi, Acting Air Attaché of the Italian Embassy; Col. Wm. A. Bishop, "ace of aces"; Mrs. Bishop; Alan R. Hawley, President Aero Club of America; Mayor Harry Bacharach, of Atlantic City; Captain Pierre Edgard Bosc, French High Commission; Lieut. E. G. Garland, Royal Air Force; Henry Woodhouse, Vice-President, Aerial League of America; Lieut. (j.g.) C. H. Payne, U. S. N.; Captain Hugh L. Willoughby, Ensign A. A. Beckwith, Lieut. Jack Frost; Augustus Post, Secretary, Aerial League of America; Lieut. D. Gregg, Mr. and Mrs. Mark Ovenden, Mr. and Mrs. Hamilton Peltz, Mr. and Mrs. Dan Clarke, Joseph H. Shinn, W. W. Young, A. S. Abell, 3rd, A. Day; George F. Kerr, Chairman, Aviation Committee, A. C. Chamber of Commerce; Albert T. Bell, President, Atlantic City Aero Club; Edward Marshall, Miss Donna Easley, Miss Hortia Willis, Mrs. Willis, Mrs. A. S. Abell, Miss Abell, Miss Helen W. Bell, Mrs. Mary Brown-Dietrich, Mr. H. C. Kinne, Mr. and Mrs. C. G. B. Sprotto, Lieut. George A. Zabriskie, Earle L. Ovington, Eddie Stinson, Mrs. William Allen Bartlett, Lieut. Dixon, Paul Favour; Dr. A. Bangachea, official representative of Guatemala; W. Lee, Mrs. Hamilton, Fred Wagner; Mr. K. Asoki, representing Major General K. Inouye, Military Attaché, Imperial Japanese Embassy; Mrs. C. T. Show, President, Springfield, Mass., Aero Club; Walter J. Buzby, Harry B. Cook, Joel Hillman, Henry W. Leeds, Mr. Samuel P. Leeds, Earl R. Ovington and Mrs. Leeds, Mr. and Mrs. J. Haines Lippincott, Mrs. Emery Marvel, Hubert Somers, Dr. J. B. Thompson, Mr. and Mrs. Daniel S. White, Mrs. John J. White, Mrs. Henry W. Leeds, Mr. Robert W. Leeds, Mrs. Marion Wright; Col. Edwards, President Columbia University Aero Club; Lt. Craigmyle, Columbia University; G. Douglas Wardrop, Rear Admiral W. N. Little, U.S.N., E. J. David.

Commercial Aerial Photograph

Paul Favour, formerly chief of the Photographic Section of the Bureau of Aircraft Production, addressing the Second Pan-American Aeronautic Convention, declaring the aerial photography is certain to play a dominating part in future surveying and map making. He said in part:

"The rapidity with which topographic surveying can be accomplished by means of the aeroplane and the camera, together with the infinite detail the photographs reveal does work that is impossible for engineers equipped with transits, levels and plane tables to secure," he declared.

"The accuracy of the photographic survey, especially over areas where great work would be difficult, is one of the strongest features. Many problems will come up that should be worked out in conjunction with the engineers.

"One of these is the possibility of making contour maps from stereoscopic negatives. Another the stabilization of the camera in the plane so that the axis of the lens is always perpendicular to the terrain. This is a very important feature when it comes to piecing together pictures to complete a certain territory because the least angle of the aeroplane will cause trouble when it comes to joining the pictures because of the list of the objects photographed.

"Another is the possibility of supplying filters that will give reasonably accurate information regarding shoals or obstructions beneath the surface of the water.

"In my opinion the work is of sufficient importance to warrant an extensive experimental program to determine the exact limitation and aerial photo-topography.

"We have found that the best results are obtained from an altitude of 3,500 feet."

The Art of Navigation

In an address on the "Recent Advances in the Art of Navigation" at the Steel Pier, Professor Charles Lane Poor of Columbia University, said in part:

"The underlying principles of modern navigation were explained without the use of mathematics. These principles were discovered by Captain Thos. H. Sumner, of Boston, in 1837, but were not developed and made practicable for the ordinary navigator until toward the end of the century. At that time Admiral Marcq St. Hilaire, of the French Navy, developed, under the name of 'new navigation,' a modification of the Summer method, which is theoretically more perfect, and which lends itself to every day use.

"However, with the facilities in use only a few years ago, the calculation involved was long and tedious. It was the bugbear of navigators. But even with this great handicap the method was so simple and its advantages so great, that it gradually became more and more used. With this increased use, there arose a demand for some simple solution, some way of avoiding the tedious calculations. De Auino tried to accomplish this, and in 1912 published his 'Altitude and Azimuth Tables.' They are really a revision and extension of tables published in 1876 by Sir William Thomson (Lord Kelvin). They are double entry tables, require double interpolation, and are difficult to use if exactitude is essential. By using an assumed position of the ship, instead of the position by 'dead reckoning,' however, the calculations by means of these tables can be greatly reduced; but the way of determining this assumed position differs with each 'sight' and the precepts to be taken into account in each reduction make the use of these tables a rather 'fussy' affair.

"The real difficulty with the old tables which were used twenty years ago was that these tables were made by mathematicians to solve any and all problems, problems in trigonometry, in surveying, in astronomy, as well as working out sights at sea. These tables were, therefore, long and cumbersome, contained many, many things that were never used at sea. In 1914 a new set of mathematical tables were prepared, a set of tables arranged with one end in view, to solve this navigational problem in the shortest and quickest way; a set of tables which does not contain an unessential figure. The principles and arrangement of these tables were adopted by the Hydrographic Office of the Navy Department, and such tables are now in use on nearly all naval vessels.

"While these tables simplify the calculations and reduce the paper work to a minimum, yet they involve the use of logarithms and the chances of error in making additions.



Representatives of twelve countries, leading aeronautic authorities and other notables at one of the many official gatherings held at Atlantic the months of June, July,

"In 1917 the possibility of long flight by aeroplanes was already recognized, and the officials of the Aero Club of America took up the question of aerial navigation. I undertook to investigate the various methods of navigation, with a view to eliminate, or simplify all calculations. The St. Hilaire method was adopted as the basis on which to work and the various logarithm tables, de Aquine tables, Johnson tables, and other short-cut tables and methods of making the necessary calculations, were carefully examined. All these were rejected as requiring too much time in working out a sight. In an aeroplane travelling at the rate of one hundred miles per hour, an observer would be carried nearly nine miles in the five minutes necessary for the practiced computer to make the calculations by any one of the three recognized methods. Besides this. the aviator has had little or no practice in mathematical calculations and it would take the average trained aviator, not five, but fifteen minutes to make the computations, and to this would be added the chance of making errors in all the additions and the nuisance of handling books, and turning from one page to another.

"The principle of the slide rule was thought of and it was applied to the solution of the problem. Early in July, 1917, several forms of slide rules were made, each of which accomplished the desired result. The earlier forms had several sliding scales; the form as finally adopted discarded all sliding parts. It consists of a fixed circular disc on which are engraved a series of concentric logarithmically graduated circles, and two rotating members, which may be moved separately or clamped together.

"The navigational slide rule, or, as it has been named by the Navy, 'The Line of Position Computer,' apparently solves the difficulty. On it one actually performs, without knowing it, all the logarithmic calculations involved in working out a sight with an accuracy sufficient for all practical purposes at sea and in the air. The entire work can be done in less than a minute and a half, and with an average error of less than two miles. Experiments made in Washington show that, after half an hour's practice, the average time required to work out a sight is one minute and six seconds. Reports from naval officers who have used these instruments constantly for months, and who have carefully checked their results against logarithmic calculations, show that the average discrepancy between results as worked out on the Computer, and as obtained through logarithmic calculations, is about one mile; that the average time saved in working out each sight is about seven minutes.

Comparisons:

Logarithm	8 openings and 45 figures.
Aquino	2 openings and 64 figures.
Computer	1 opening and 4 figures.

Aerial Transport and Airways

Epochal development of countries of vast territorial sweep whose visions of commercial growth have been throttled by the enormous expense involved in the construction of railroad lines, is to come on the wings of the aeroplane. Aeronautic authorities, speaking on the subject of "The Pan-American Aerial Transport and Airways Over Land and Sea" before the second Pan-American Aeronautic Congress, expressed the conviction that aircraft offer immediate opportunity to such countries to actualize ambitions to take their place in world trade and prosperity commensurate with their territary.

Augustus Post, secretary of the Aero Club of America, who presided, introduced the subject by pointing out that inventions—particularly those that have increased the speed of transportation and intercommunication, like the steamship, the railroad, the telephone—have changed world conditions. He asserted that the advent of the steamship made the Atlantic the central basin of the world, succeeding the Mediterranean Sea, and observed that it does not require undue prescience to foresee that the Pacific will succeed the Atlantic as the central basin of the world, with the commercial development which aerial transportation promises to bring in South and Central America, the northwestern part of the United States, Alaska, Canada, Australia, New Zealand, Japan and China.

Boston-Atlantic City Flight

Three hours and 55 minutes flying time was the record established by Melvin W. Hodgdon, of Somerville, Mass., in a flight from Boston to Atlantic City Air Port—a distance of 340 miles by the air route, May 16th. Aviator Hodgson carried Ralph J. Dale, of Allston, Mass., as his passenger.

The start was made from Saugus Field, six miles north of Boston, at 2:35 o'clock, in a steady west wind. At 4:50 the plane was soaring over Long Island, where it made a landing at Central Park. The aviators had to go seven miles by automobile to secure enough gas to replenish their supply for the run to the shore. They took supper at a nearby inn and took to the air at 6:10 for their trip to Atlantic City.

The machine appeared over the air port at 7:46, circled over the field and made a landing at 7:50 o'clock. They were given a dinner by the aero officials in recognition of their feat in making the long flight from an outside point to the shore.

By their trip here they quality first for the prizes offered by the Boston Globe for the aviator who makes the best record in a flight to or from Boston during the month of May with the air port here as the landing or take-off point. A trophy and $1,000 goes to the winner. They also become contenders for the Pulitzer trophy for the aviator who makes the best record in flying land or water planes from anywhere to Atlantic City or from the port here to anywhere during the month, and the New York Herald Efficiency prizes for the aviator making the longest non-stop run from any point to the shore or from Atlantic City to some other point, the first prize being $1,000.

New University Entries

Entries from four more prominent universities for the intercollegiate aeroplane contest has created keen interest in the new form of sport by the institutions in this section.

The race will be run around the pylons which are erected as turning points on the five kilometer course over the

(*Continued on page* 552)



City, last week, in connection with the Second Pan-American Aeronautic Convention, Exposition and Contests, which are to continue throughout August and September

RECORD OF THE COMPETITIONS

MAY 1st CONTEST:

ROLAND ROHLF. Hon. Victor Hugo Barranco, passenger, 90 h.p. Curtiss "Oriole" Biplane, from Westbury, Long Island, to Atlantic City Air Port, 118 miles; two hours and eight minutes. Return flight, one hour and twenty-five minutes. Both flights in driving storms.

EDDIE STINSON. Lieut. G. W. Shaw, U. S. N., passenger. 90 h.p. Curtiss Biplane, from Queens, Long Island, to Atlantic City Air Port; two hours, thirty-three minutes, in driving storm.

E. K. JACQUITH. 90 h.p. Flying Boat from Atlantic City to Rockaway Naval Air Station in driving storm; one hour, forty-five minutes.

MAY 2d CONTEST:

B. H. KENDRICK. 90 h.p. Flying Boat from Newark to Atlantic City; two hours, fifteen minutes.

E. K. JACQUITH. 90 h.p. Flying Boat from New York to Atlantic City; two hours, twelve minutes.

MAY 3d CONTEST:

A. LINVINGSTON ALLEN, with John P. Davis as passenger, flew from Roosevelt Field, L. I., to Atlantic City Air Port in one hour, twenty minutes.

MAY 5th CONTEST:

EDWARD V. GARDINER left Bustleton, Pa., at 1:57 P.M. and flew to Atlantic City, arriving 3:07 P.M. Time, one hour and ten minutes.

ROBERT SHANK accomplished the same flight in the same time, but carried Pathe News operator as passenger.

MAY 6th CONTEST:

. ORTON HOOVER, in Curtiss M.F. boat, flew from Atlantic City to Walnut Street Bridge, Philadelphia, in two hours and twenty-five minutes, leaving at 5 P.M. and arriving 7:25 P.M., in driving electrical storm, carrying Charles Henry Davis as passenger.

MAY 8th CONTEST:

ROBERT SHANK, with Wm. O. Burton of No. 755 Park Avenue, N. Y. C., flew from Atlantic City to New York via Long Branch in two and one-half hours, exact time of departure and arrival unknown.

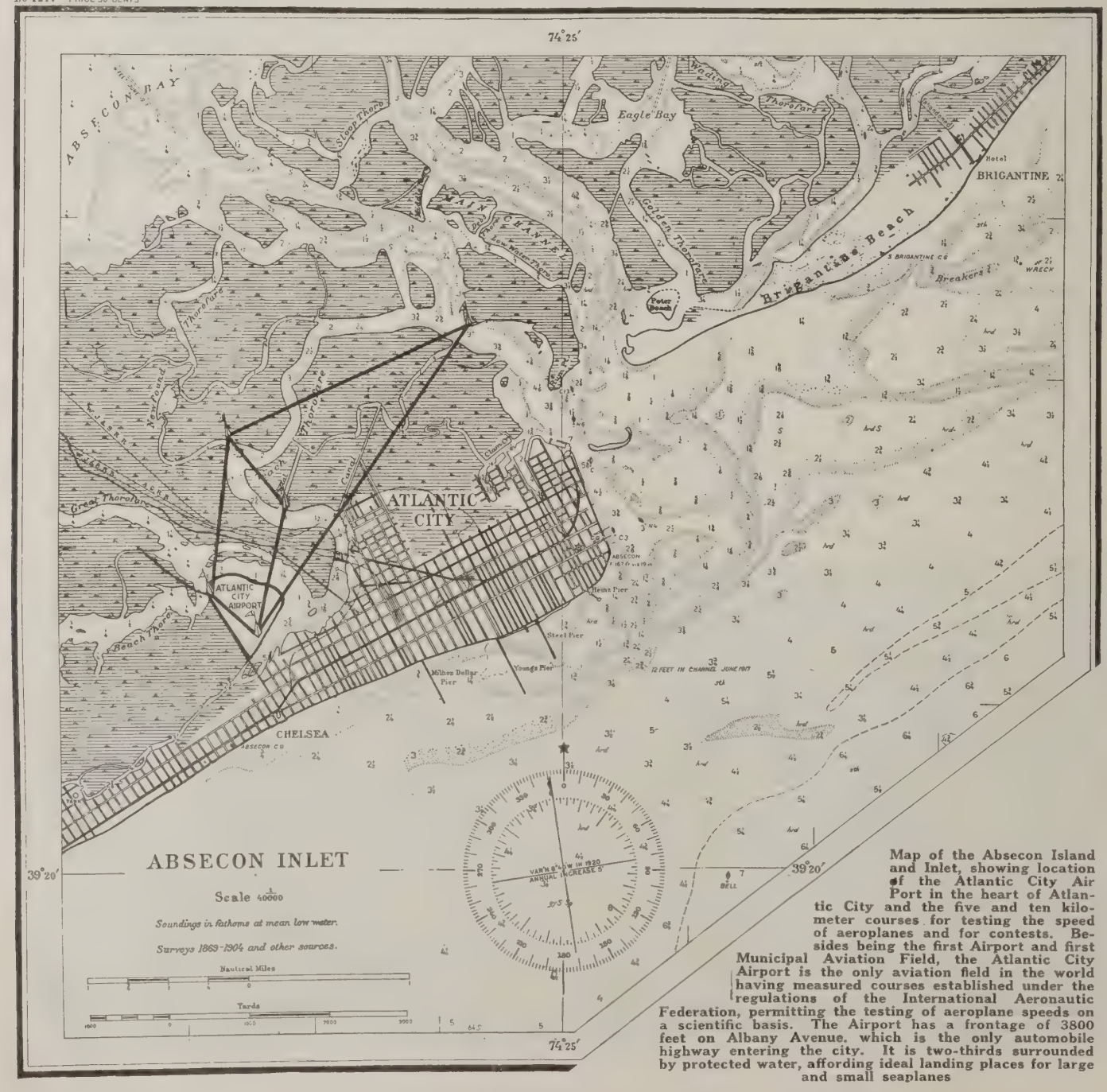
MAY 13th CONTEST:

ROBERT SHANK, with Miss Hazel Allen as passenger, flew from Belmont Field, N. Y., to Atlantic City in one hour and twenty-one minutes, hour of departure unknown here, but time is correct.

The above flights were in competition for the Pulitzer Trophy and Herald Efficiency Prize.

On May 10th, Mr. W. L. Watkins gave a demonstration of his parachute, dropping bag weighing 75 pounds in a very successful demonstration of accuracy of drop. Also on May 13th he dropped a crate of eggs from 700 feet in 20-mile wind without breaking an egg.

No 1217 PRICE 50 CENTS



Map of the Absecon Island and Inlet, showing location of the Atlantic City Air Port in the heart of Atlantic City and the five and ten kilometer courses for testing the speed of aeroplanes and for contests. Besides being the first Airport and first Municipal Aviation Field, the Atlantic City Airport is the only aviation field in the world having measured courses established under the regulations of the International Aeronautic Federation, permitting the testing of aeroplane speeds on a scientific basis. The Airport has a frontage of 3800 feet on Albany Avenue, which is the only automobile highway entering the city. It is two-thirds surrounded by protected water, affording ideal landing places for large and small seaplanes



THE NEWS OF THE WEEK



Professor Todd Sails for Montevideo to Observe Solar Eclipse from Seaplane

New York, May 14.—Professor David Todd, who has charge of the Amherst College Astronomical Observatory, sailed May 13 on the American steamship Elinor, bound for Montevideo, to take observations of a solar eclipse on May 29. Professor Todd will make his observations from a naval aeroplane at an altitude of 10,000 to 15,000 feet, taking photographs of the phenomenon from the vantage in height thus gained, which is an innovation in astronomical observations.

Prof. Todd is accompanied by Ensign G. L. Richard, Ensign W. H. Cushing, N. V. Copwell, J. P. Briggs, E. C. Leonard, and A. D. Hallington, all machinist mates, first class. A big naval hydroaeroplane was on the after deck, from which it will ascend to make this experiment.

Before sailing Professor Todd described the plans for his expedition as follows:

"When the Elinor is in latitude 2.30 north and longitude 18 west at high noon on May 29, when the sun will be 15 degrees north of the zenith. The ship will be stopped and the biplane-hydroaeroplane in charge of the navy crew will ascend to an altitude of from 10,000 to 15,000 feet above the sea, where it is hoped that we shall be able to get some fine pictures of the eclipse, which will last six minutes and fifty seconds.

"The object in going above the clouds to observe the eclipse is to get some clear pictures of the solar corona. Fully 50 per cent of the former expeditions to observe eclipses on land from the sea level have been failures because of clouds. I have been practising flying and making observations with my telescope from the naval station at Miami, Florida.

"The rays from the corona which affect the human eye are the red ones, while the blue affect the photograph plates. These blue rays are absorbed by the atmosphere in their descent toward the earth from the corona, and the theory of ascending, say, 13,000 feet is that being one-third of the whole of the atmosphere the pictures will be much clearer."

Trap Shooter Flies to Tournament

Plainfield, N. J., May 16.—Lieut. E. E. Ballough, formerly of the 89th Aero Squadron, with T. K. Apgar, arrived at the grounds of the Arrow Head Rod and Gun Club, to participate in a trap shooting contest held by the club, in a Curtiss JN4B biplane. The aviators carried a message from Mayor John F. Hylan of New York City, wishing success to the meet.

McAlpine-Traymore Passenger Service Has Its First Trial

New York, N. Y.—The first trip of the Traymore Air Service between New York and Atlantic City was made on May 14 with Miss Hazel Allen, hostess of the McAlpin Hotel, as the passenger. The journey was made in a Canadian Curtiss 100 horsepower two-seater, with Aviator "Bob" Shanks as pilot, and the distance was covered in eighty-five minutes. A favorable wind aided in making the trip.

The start was made from Belmont Field. The flight was made under the auspices of the Traymore Hotel of Atlantic City, and there was a large crowd in front of the hotel to watch the aeroplane land on the beach.

Packard Company Building Aviation Field Near Detroit

Detroit, Mich.—Packard Motor Car Company has acquired a tract of land on the outskirts of Detroit for use as a private experimental flying field in the development of its aviation program. The field lies between Detroit and Mt. Clemens, almost midway between Morrow Field in Northwest Detroit and Selfridge Field near Mt. Clemens; it is large enough to permit of the landing of any kind of aeroplane; it is accessible by improved highway and interurban railway; and it is easily susceptible of improvements which will be begun at once to make it a model experimental field.

Through the efforts of Messrs. Deeds and Kettering, a fine field has been established at Ohio State University, in Columbus. Prominent citizens of Detroit are supporting a movement to have the municipality take over the present U. S. air service field, known as Morrow Field, in the Northwest outskirts of Detroit.

Officials of the Packard Company realize that the establishment of a series of fields within flying distance of their own will be of mutual advantage, and state that they will encourage the full utilization of every facility.

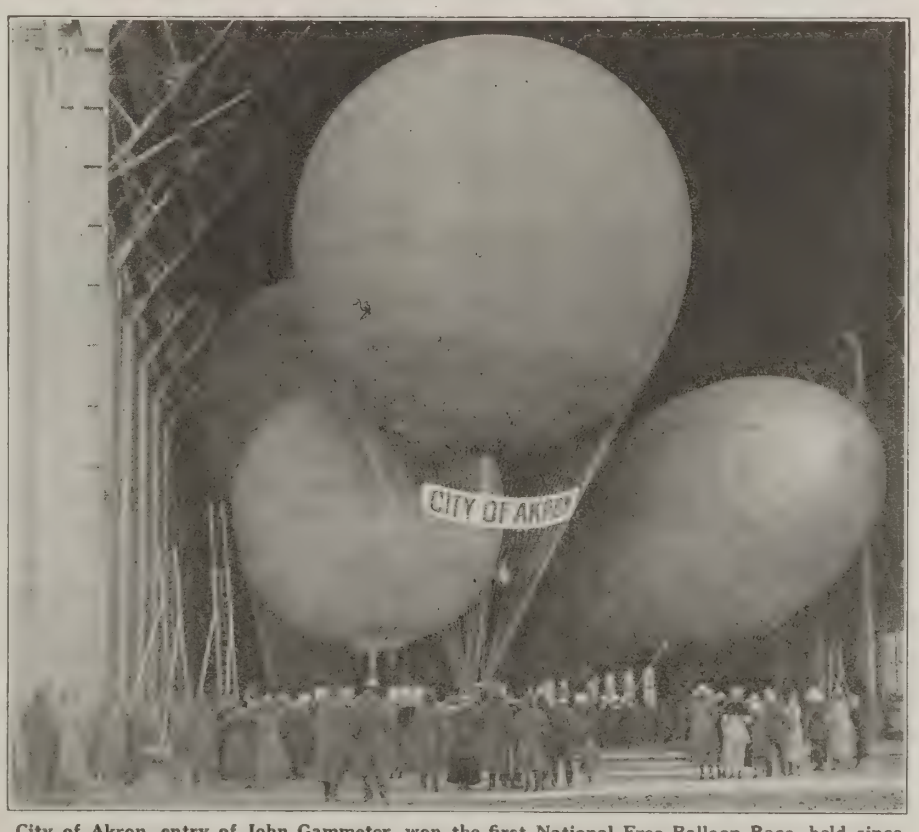
Liquidation Commission Balances British-American War Supplies Account With $35,000,000 Payment to Us

The Liquidation Commission in Paris, of which Judge Parker is chairman, assisted by Mr. Chester W. Cuthell, Special Representative of the Secretary of War, dealing with Inter-Allied claims, went to London on April 30, and they have just cabled that after a series of conferences they have reached a complete and satisfactory adjustment of all outstanding claims which the British have against us and which we have against the British, growing out of war supplies manufactured in this country or abroad, and that the net result is a payment of $35,500,000 to us by the British. This covers the production of spruce, Liberty motors, wood distillates, nitrocellulose powder, cotton linters and wool.

Akron Balloonists Fly 400 Miles in 22 Hours

Washington, May 13.—Announcement has been made that the balloon entered by the ex-navy men of Akron won the Akron Flying Club Race by a 22-hour flight ending at Ocean City, Md. The balloon was piloted by Ensign P. D. Collins of the U. S. N. R. F. Second place was won by C. H. Roth and C. E. Earle, with C. W. Seiberling, vice-president of the Goodyear Co., as passenger. Landing was made at Millsboro, Delaware.

The balloons left Akron, Ohio, at 1 o'clock Sunday afternoon, all flying the American colors and each covered an approximate distance of 350 miles, except the one that made its forced descent in Pennsylvania, it having been fired at seventeen times by some unknown person or persons, and four of the shots took effect in the balloon, forcing a descent. The balloon shot down made its descent in Pennsylvania.



City of Akron, entry of John Gammeter, won the first National Free Balloon Race, held since 1914, by a 400 mile flight to Ocean City, Md.



Crew of the Navy dirigible C-5. From left to right: Com. E. W. Coil (commanding pilot), Lt. J. V. Lawrence (pilot), Lt. M. H. Easterly (radio operator), Ensign D. P. Campbell (2nd assistant pilot), Chief Mach. Mate T. L. Moorman (engineer) and Chief Mach. Mate S. H. Blackburn (engineer)

Flying Field for Brighton Beach

New York, May 19.—Announcement was made that a group of former Army aviators of the British and American service will open a flying field at the old Brighton Beach Race Track, near Coney Island. Passenger carrying will be conducted at reasonable rates and a regular flying course given. A service between the Brighton Beach Field and New York City is contemplated, if permission for landing at Van Cortlandt Park or some other point can be secured from the municipal authorities.

Four aeroplanes will be in constant service and no admission to the field will be charged.

Aerial Motion Picture Photographers Form Company on Pacific Coast

San Francisco, Cal.—A company has been organized to take aerial films and photographs and carry passengers for advertising purposes throughout the State of California. B. M. Spencer, formerly chief instructor at McCook Field, is chief pilot. Several educational films have been taken from the air and the company is prepared to take photographs of cities and towns, real estate developments, rivers, lakes, irrigation projects, farms, ranches and estates.

Salt Lake City Aerial Sightseeing Service

Salt Lake City.—On Decoration Day an aerial transportation and sightseeing service will be inaugurated, according to an announcement made by a group of Salt Lake City capitalists who are backing the project. Lieut. G. C. Beck, a former army aviator, is active head of the company and J. C. Kinney, an oil promoter, and L. J. Gilmore, president of the Utah Motor Company, are interested in the service.



The Pioneer Wing of the Police Reserve Air Force inaugurated at Sheepshead Bay. The mascot, little Miss Dyer, is presenting a letter to her father, Police Inspector Dyer, for delivery in Philadelphia

Army Aircraft to Fight Forest Fires

Washington, D. C.—Army aeroplanes and captive balloons will cover portions of the national forests of California, Arizona, New Mexico and other States this summer to aid in detecting and suppressing forest fires. In compliance with an order from Secretary Baker directing the Air Service to co-operate with the Forest Service of the United States Department of Agriculture in this work, conferences are under way to determine where and to what extent the air scouts will supplement the forest rangers.

That there is a distinct and important place for aircraft in fire protection of timberlands is regarded by the forestry officials as beyond doubt, but experimenta trial of methods and possibilities will have to be the first step. This is now being planned for the coming fire season. Army aerodromes and bases will be utilized for the experiments. Some of the bases near enough to national forests to be used advantageously are the flying fields at San Diego, Riverside and Arcadia in southern California. Other points in the West and in the East are under consideration, including one near the White Mountains in New Hampshire.

One of the interesting possibilities to be tested is bombing fires to put them out. It is believed that bombs charged with suitable chemicals can be used with good results. Another plan to be tested is transporting fire fighters by dirigibles from which ladders can be lowered to the ground.

The chief use of the aircraft this summer, however, will be for fire detection. At present the foreign service relies for this partly on patrol, usually by men on horses, motorcycles or railroad speeders, and partly on watchers stationed at lookout points.

Lookouts in a very broken country, cut up by deep canyons or where mountain ridges obstruct the view, or in a flat country that affords no good points of vantage, are often unable to pick up all fires quickly by the rising smoke, or to locate them accurately. For precise location the system in use depends on triangulation through reports telephoned from separate observation points. Aeroplanes will use wireless in recording fires, as they have done in communicating with the artillery, and would locate fires by co-ordinates in the same way that gun fire in war is directed to a particular spot or object.

Secretary Crowell to Study Civilian Aviation in Europe

Washington, May 17.—Benedict Crowell, Assistant Secretary of War, and a number of military and civilian aviation experts will leave for Europe on May 24 aboard the transport Mt. Vernon to study possibilities of developing the science of aviation along the lines of civilian usages.

Included in the party will be Lieut.-Col. James A. Blair, of the General Staff; S. S. Bradley, of the Manufacturers' Aircraft Association; G. H. Houston, president of the Wright-Martin Aircraft Corporation; C. M. Keys, vice-president of the Curtiss Aeroplane & Motor Corporation, and Howard Coffin, of the Council of National Defense.

Colonel Halsey Dunwoody, Chief of the Air Service overseas, will join the party in France.

RECORD TRIP OF NAVAL DIRIGIBLE C-5

AFTER an historic flight, during which it was in the air over twenty-five hours, the Navy dirigible C-5, which left Montauk Point, Long Island, and reached St. John's, Newfoundland, broke her moorings and was carried to sea. At the time of writing the dirigible has not been located, and it has officially been given up as lost. It is stated that plans are now being pushed by the Navy authorities to substitute another dirigible for the flight.

The C-5 arrived at the Pleasantville base, near St. John's, after being in the air continuously for twenty-five hours and forty minutes. A perfect landing was made within the narrow confines of the old cricket field which was chosen as the anchorage for the airship. Lieutenant J. V. Lawrence was at the wheel at the completion of the voyage, and the manner in which he handled the ship while the landing was being performed evoked a cheer of admiration from the crowd which had gathered.

As soon as she had been secured at her anchorage a big force, under Lieutenant Little, was set to work preparing the ship for the transatlantic flight. It was not long before the treacherous wind began to play upon the dirigible, and early in the afternoon she was torn from her anchorage, but was recaptured and secured again.

Immediately after arrival, Lieutenant Commander Coil and his crew got out of the car and prepared to take twelve hours sleep before continuing their flight across the Atlantic. Before turning in, however, he told the story of the trip to Newfoundland.

In it he gave all the credit to Lieutenant Campbell and Lieutenant J. V. Lawrence, both of whom, he said, were weary "and almost seasick," but stuck to their posts. He also described the period of several hours during which the airship was "lost" over Newfoundland.

"We made a 'landfall' at St. Pierre," he said, "but found ourselves on the west instead of the east shore of Placentia Bay. From this point we attempted to follow the Chicago's radio directions, but they did not work. For the moment we were lost.

No Trouble From Fog

"We started 'cross lots' and saw about all of Newfoundland, and I must say that this is the doggondest island to find anything on I ever struck. Eventually we hit the railroad track and followed it to Top Sails, which we identified, and then continued on to St. John's. There was considerable fog, but it did not trouble us.

"Throughout the time we were trying to find ourselves we had difficulty with our wireless set, and part of the time it was out of commission.

"Our troubles started just after midnight, when the sky become overcast. Before then we had been flying under a full moon at an altitude of 1,000 feet. We lost our bearings while approaching Little Miquelon Island, off the south coast of Newfoundland, about 170 miles from St. John's.

Commander Coil praised the work of the landing crew which moored the dirigible. Rear Admiral Spencer S. Wood, commander of the aviation base, greeted the C-5's commander.

The flight of the C-5 established, it is believed, a world's record for non-rigid airships for total distance covered without a stop.

The C-5 is 192 feet long, 43 feet wide, and 46 feet high;

(*Continued on page* 552)



The Naval Dirigible C-5, which made a successful flight from Montauk Point to Newfoundland, was unfortunately torn from her moorings shortly after landing

THE TRANSATLANTIC FLIGHT

THE NC-4 arrived safely at Horta, the Azores, after covering the distance of 1,200 nautical miles between that point and Trespassey Bay, Newfoundland, in 15 hours and 18 minutes. She took off at 6:07 P. M., New York time, on May 16, and arrived at Horta at 9:25 A. M., New York time, on May 17.

Her two sister ships, the NC-1 and NC-3, took off at Trespassey Bay at 6:09 P. M. and 6:07 P. M. respectively, but did not complete the trip to the Azores, owing to the serious weather difficulties encountered. The NC-1 lost her bearings in the heavy fog and landed at 8:19 A. M. 200 miles west of the island of Corvo, where her crew was picked up and the seapalne taken into tow by the steamship Iona. Later dispatches reported that the NC-1 was abandoned after being towed a distance of 80 miles.

Considerable anxiety was felt for the safety of the NC-3, the flagship of the fleet, when no news of her was received for a period of over fifty hours. She finally taxied into Ponta Delgada at 1:50 P. M. (N. Y. time) on May 19, after having landed 205 miles out at sea at 9:30 A. M. on May 17. The crew is safe and well, but the flying boat so damaged by the pounding of the heavy seas that she is being dismantled.

That the NC-4, which is commanded by Lieutenant-Commander A. C. Read, should be the only plane to complete the flight to the Azores, after her difficulty in arriving at Tespassey Bay from Rockaway, is a surprise to some, who predicted that the NC-4 would prove the least successful of the three seaplanes. She was forced to drop out on the way from Rockaway to Halifax on May 8 and stop for repairs at Chatham. On May 14, she made the flight to Halifax and on the day following covered the 461 nautical miles from Halifax to Trespassey Bay in rapid time. Her average, however, was reduced by an enforced stop for repairs during the flight. The time for the three flying boats for each stage of the journey is as follows:

NC—4	Left	Arrive	Knots	Hrs. Speed
Rockaway to Chatham (May 8)	10.04 A.M.		(Not announced)	
Chatham to Halifax (May 14)	9.05 A.M.	1.15	340	4h 10m 85
Halifax to Trepassey (May 15)	9.52 A.M.	5.37	461	8h 45m 58
Trepassey to Horta (May 16)	6.07 P.M.	9.25 A.M.	1,200	15h 18m 80
NC-1				
Rockaway to Halifax (May 8)	10.04 A.M.	7.08	540	9h 4m 60
Halifax to Trepassey (May 10)	8.45 A.M.	3.41	461	6h 56m 65
Trepassey to Horta (May 16)	6.09 P.M.			
NC-3				
Rockaway to Halifax (May 8)	10.04 A.M.	6.58	540	8h 56m 60
Halifax to Trepassey (May 10)	12.39 P.M.	7.31	461	6h 52m 65
Trepassey to Horta (May 16)	6.06 P.M.			

(Time is reckoned by New York time and distance and speed are reckoned by nautical miles, sixty nautical miles being equivalent to sixty-nine land miles.)

The official log, as issued by the Navy Department, shows the progress of the planes during the entire flight. The log follows:

May 17, 1919, 8:45 a.m.—From naval radio station, Bar Harbor: "Progress of three seaplanes from Trepassey to Azores: Ahead of estimated distance at 06:25 by 125 nautical miles. Above time 'planes reported passed Station Ship No. 13, 650 nautical miles out. Cape Race still in communication with No. 4."

8:58 a.m.—From Horta: "NC-4 passed Station No. 18 at 09:45 (5:45 New York time); NC-3 passed Station No. 13 at 06:23 (2:23 New York time); NC-1 passed Station No. 18 at 10:14 (6:14 New York time); NC-1 passed Station No. 16 at 09:17 (5:17 New York time)."

9:32 a.m.—From Horta: "NC-4 passed Station No. 22 at 12:10 (8:10 New York time)."

9:47 a.m.—From U. S. S. Melville: "NC-1 passed Station No. 16 at 09:17 (5:17 New York time); NC-4 passed Station No. 18 at 09:45 (5:45 New York time)."

10:07 a.m.—From U. S. S. Melville: "Last report received NC-4 passed Station No. 16 at 08:80 (4:30 New York time); NC-1 passed Station No. 13 at 07:13 (3:13 New York time); NC-3 passed Station No. 9 at 04:10 (12.10 a.m. New York time)."

10:59 a.m.—From Horta at 13:25 (9:25 a.m., New York time): "NC-4 arrived Horta."

11:05 a.m.—From U. S. S. Melville: "NC-4 reported sighted land at 11:35 (7:35 New York time)."

11:06 a.m.—From U. S. S. Melville: "NC-1 passed Station No. 19 at 10:14 (6:14 New York time); NC-3 between Station No. 17 and Station No. 18 at 09:15 (5:15 New York time), but off course; NC-4 passed Station No. 22 at 12:10 (8:10 New York time), weather foggy."

11:08 a.m.—The Melville: "No. 4 passed Station No. 22 at 12:10."

11:10 a.m.—From Horta to naval radio station at Arlington following message received from NC-4: "We have picked up land again; think it is Pico."

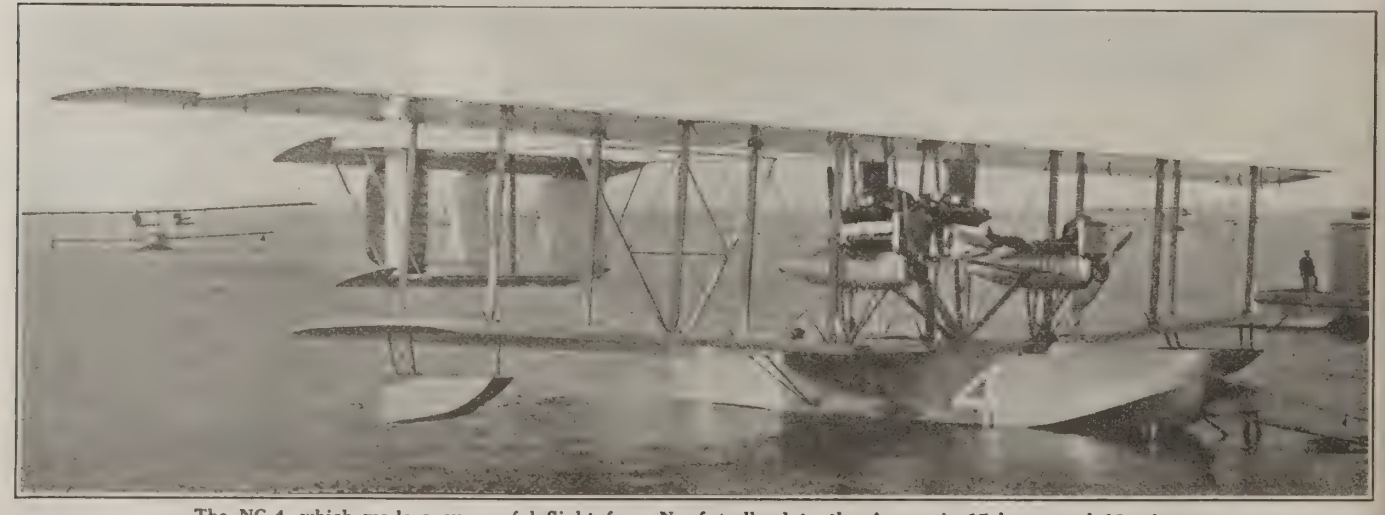
11:11 a.m.—From Melville: "Last information received from NC-3 at 09:25 5:15 New York time), 'we are off our course somewhere between Station No. 17 and Station No. 18.'"

11:12 a.m.—From Melville: "Last information received NC-4 passed Station No. 22 at 12:10 (8:10 New York time); NC-1 passed Station No. 18; NC-3 off course somewhere between Station No. 17 and Station No. 18."

11:46 a.m.—The Prairie: "Progress of three seaplanes from Trepassey to Azores ahead of estimated distance at 06:25 (2:25 New York time), by 125 nautical miles. At above time 'planes reported passed Station No. 13, 650 nautical miles out. Cape Race still in communication with NC-4."

2 p.m.—From Melville: "NC-4 arrived at Horta this morning. Weather conditions Ponta Delgada: Weather around islands misty with frequent rain squalls."

2 p.m.—From the Prairie: "Extraordinary perforanne NC 'planes all done on load of 1,630 gallons petrol and six men, except NC-3, with crew of five men. Lieutenant Rhodes not taken. With Rhodes NC-3 would have 185 pounds excess of any other 'plane. Successful start due in large measure to tireless work of



The NC-4, which made a successful flight from Newfoundland to the Azores in 15 hours and 18 minutes

crews of seaplanes, plus coöperation all officers and men Trepassey ships. Aerography most important factor. Arrangements for weather reports complete and accurate.

3:30 p.m.—From U. S. S. Columbia at Horta: "NC-4 at Horta waiting for favorable weather before proceeding to Ponta Delgada. Not expected to leave until tomorrow."

May 16, 1919, 6:03 p.m.—From U. S. S. Aroostook: "Seaplane NC-3 began taxying for Azores flight 20:56 (4:36 p.m., New York time)."

6:23 p.m.—From U. S. S. Aroostock: "Seaplane NC-4 began taxying for Azores flight 20:53 (4:53 New York time)."

7:10 p.m.—From U. S. S. Aroostock "Seaplane NC-1 began taxying for Azores leg, 20:53 (5:13 New York time)."

7:17 p.m.—From U. S. S. Aroostook: "Seaplane NC-4 took off water on Azores flight, 21:36 (5:36 p.m., New York time)."

7:27 p.m.—From U. S. S. Aroostook: "Seaplane NC-4 landed Trepassey harbor 21:53 (5:53 p.m., New York time) after circling harbor."

7:52 p.m.—From U. S. S. Aroostook: "Seaplane NC-4 took off water on Azores flight, 22:07 (6:07 p.m., New York time)."

7:53 p.m.—From U. S. S. Aroostook: "Seaplane NC-4 left water for Azores leg 22:06 (6:06 p.m., New York time)."

Note—See 8:32 p.m.

7:55 p.m.—From U. S. S. Aroostook: "Seaplane NC-1 took off water on Azores flight 22:09 (6:09 p.m. New York time.)"

8:27 p.m.—From U. S. S. Aroostook: "Seaplanes NC-1, NC-3, NC-4 passed from flight at 22:20 (6:20 p.m., New York time)."

8:30 p.m.—From U. S. S. Aroostook: "Seaplanes NC-1, NC-3, NC-4 passed from flight on historic voyage at 22:20 (6:20 p.m., New York time)."

8:32 p.m.—From U. S. S. Aroostook: "Seaplane NC-3 left Trepassey 22:04 (6:04 p.m., New York time.)"

8:41 p.m.—From U. S. S. Aroostook: "Seaplane NC-1 left water at 21:36 (5:36 p.m., New York time), on Azores leg"; (delayed).

8:44 p.m.—From U. S. S. Aroostook: "Seaplane NC-4 left Trepassey 21:36 (5:36 p.m., New York time)"; (delayed).

9:08 p.m.—From U. S. S. Aroostook: "Seaplanes NC-3 and NC-1 left water 22:11 (6:11 p.m., New York time), on Azores leg"; (delayed).

9:09 p.m.—From U. S. S. Aroostook: "Seaplanes NC-4, NC-3 and NC-1 left Trepassey at 22:11 (6:11 p.m., New York time), for Azores"; (see 7:55, 7:52, 8:32, 22:09 taken as official time of start by Navy Department).

11:12 p.m.—From U. S. S. Aroostook: "Last night new engine placed on NC-4. All 'planes given complete inspection this morning, warmed, and given finishing touches in early afternoon. Wind fresh, west, late afternoon, favorable for start. NC-3 got under way taxying at 20:36 (4:36 p.m., New York time); NC-1 got under way taxying at 20:56 (4:56 New York time); NC-4 got under way taxying at 21:13 (5:13 p.m., New York time); NC-4 stopped all motors at 21:18 (5:18 p.m., New York time), but began taxying again after delay of four minutes at 21:22 (5:22 p.m., New York time). All 'planes taxying around harbor to warm up motors. NC-4 got off the water at 21:37 (5:37 p.m., New York time), and after circling around harbor and to the mouth of Mutton Bay she landed at Trepassey Harbor again at 21:53 (5:53 p.m., New York time), on account of seeing other 'planes not yet up. All 'planes made a long run down the harbor three points



Harry G. Hawker, who took off from Newfoundland at 1:55 P. M., on May 18, has not been reported within 72 hours from his start

off the wind and took off, NC-3 leading at 22:06 (6:06 p.m., New York time), NC-4 following closely at 22:07 (6:07 p.m., New York time; NC-1 in the rear at 22:09 (6:09 p.m., New York time). They were flying low and circling around point across mouth of Mutton Bay. Three giant 'planes passed out of sight in the direction of Mistake Point at 22:20 (6:20 p.m., New York time). Weather conditions for Azores run good; with present wind continuing during night she should reach Azores in nineteen hours. The crews are in the pink of condition and are happy to leave on the 1,372-mile run."

11:44 p.m.—From U. S. S. Prairie: "All seaplanes passed Station 6 at 02:05 (10:05 p.m., New York time)."

11:50 p.m.—From U. S. S. Prairie: "'Planes passed Station Ship 3, NC-1 passed at 24:03 (8:03 New York time); last plane passed at 00:15 (8:15 p.m., New York time)."

May 19, 1919, 2:00 a.m.—From United States steamship Melville: "Seaplane NC-2 passed station ship 7 at 02:58 (10:58 p.m., New York time)."

2:09 a.m.—From United States steamship Melville: "Seaplane NC-4 passed station ship 8 at 03:29 (11:29 New York time)."

2:11 a.m.—From United States steamship Melville: "Seaplane NC-3 passed station ship 9 at 09:10 (12:10 a.m., New York time)."

2:11 a.m.—From United States steamship Melville: "All three 'planes had passed station ship 8 at 03:50 (11:50 p.m., New York time)."

2:36 a.m.—"NC-1—have you heard anything NC-3? We have just passed station ship 13. Signed NC-1."

2:53 a.m.—"Thanks to the S. S. Norger. Good wishes." Same plane was calling station ship 18).

3:56 a.m.—From Naval Radio Station, Bar Harbor: "Last heard of seaplanes at 3:21 a.m. and signals were getting weaker. However, freak work may avail itself early in the morning, and it is probable that we may hear seaplanes until 6 a.m."

4:30 a.m.—From United States steamship Melville: "Seaplane NC-4 passed station ship 14 at 07:06 (3:06 a.m., New York time)."

5:56 a.m.—From United States steamship Columbia: "Seaplane NC-1 passed station ship 13 at 07:13 (8:13 a.m., New York time)."

7:04 a.m.—From United States steamship Prairie: "NC-4 passed station ship 11 at 05:50 (1:50 a.m., New York time)."

On the day following, May 18, Harry G. Hawker and Lieutenant Commander Grieve started on their attempt to cross the Atlantic in a Sopwith biplane. Hawker will use the direct route from Newfoundland to Ireland, a distance of 1,760 nautical miles. He took off at 1:55 P. M. Immediately after taking off, Hawker released his landing chassis and headed eastward at a speed of more than ninety miles an hour. No news of Hawker has been received within 72 hours of his start.



The Sopwith Biplane which Hawker attempted to fly across the Atlantic

THE STURTEVANT AEROPLANE ENGINES

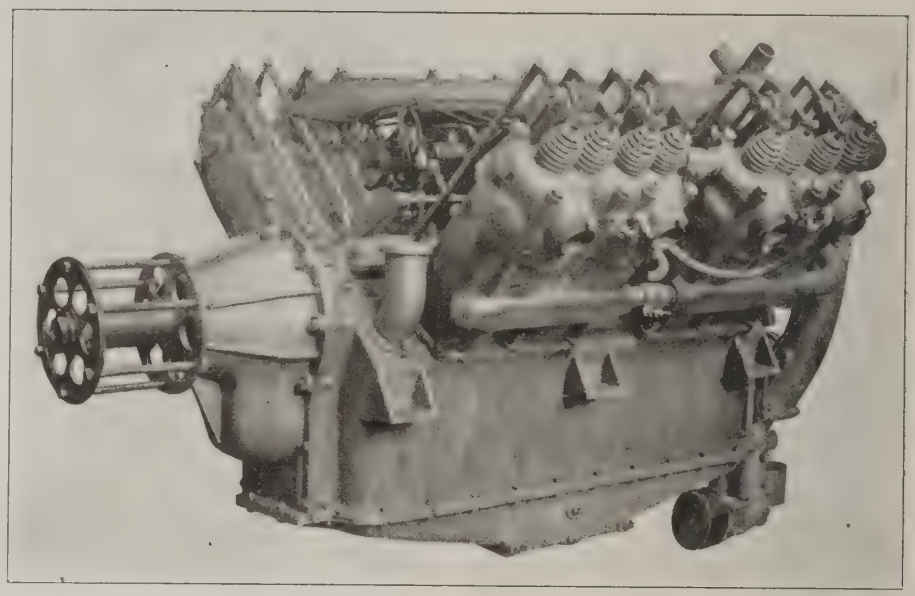
PERFECTED developments of many years' experience in building aeroplane engines is represented in the Sturtevant 8-cylinder engines. All features of design and construction are predicted on reliability and emphasis is laid upon this point in test.

Balance of reciprocating parts has received individual attention because only by accurate balance both static and running can the engine operate without vibration and stand out under the great strain which flying imposes.

Exhaustive study has been given to the subject of heat treatment of high grade alloy steels with the result that important improvements in methods have increased the strength of these materials at the same time reducing the weight of the parts.

With the exception of some small accessories, all parts of the engine are made, assembled, and tested in one plant, and guaranteed by one concern. This applies to forgings and all other processes in the manufacture of the engines.

A large completely equipped test house is maintained with facilities for testing under conditions closely approximating actual service requirements. Each engine is subject to rigid preliminary tests for several hours at full speed, full load, after which it is taken apart, examined, and again given a strenuous final run for several hours under full load, full speed conditions. A complete record of the test performances of each individual engine is kept and a copy of the test record given to the purchaser.



The Sturtevant Model 5A-4½, 210 H. P. engine, showing magneto accessibility

General Specifications

The engine is of the eight-cylinder "V" type, four-stroke cycle, water-cooled. It is made in two models, as follows:

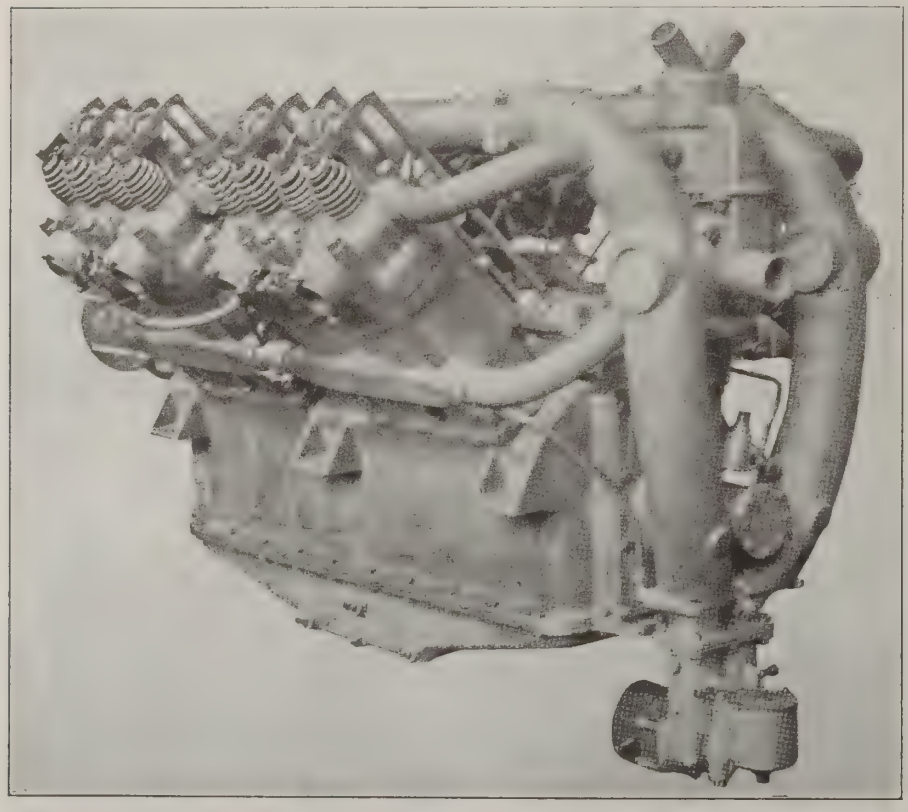
Model 5A-4½, 210 H. P., has a bore of 4½" and a stroke of 5½", equivalent to 114 mm. x 140 mm. The normal operating crankshaft speed is 2,250 R. P. M. The propeller shaft, driven through reduction gears with a ratio of 5:3, operates at 1,350 R. P. M.

Model 5A, 140 H. P., has a cylinder bore of 4" and a stroke of 5½", equivalent to 102 mm. x 140 mm. The normal crankshaft speed is 2,000 R. P. M.; that of the propeller 1,200 R. P. M.

The larger engine is designed for maximum power at high altitudes and is equipped with devices for this purpose. It is essentially an engine for the high-speed express type of aeroplane.

The smaller engine is articularly fitted for use in the training type of aeroplane and is designed with view to maximum reliability and durability.

The engines are similar in all major features of design and construction. Illustrations and descriptions of parts which follow apply to both models.



Sturtevant Model 5A-4½, 210 H. P. engine, showing water jacketed inlet manifold

Table of Specifications

Model 5A

Bore.....4" (102 mm.)
Stroke.....5.5" (140 mm.)
Displacement.....555 cu. in.
Number of cylinders.....8
Arrangement of cylinders.....90°-"V"
Cooling,

Water circulation by centrifugal pump
Cycle 4-stroke
Ignition,

Two 8-cylinder high-tension magnetos
Carburetor,

Zenith. Water jacketed manifolds
Oiling system,

Dry sump, complete forced feed
Normal engine speed.....2,000 R.P.M.
Propeller speed .....1,200 R.P.M.
Rated horsepower 140
Maximum horsepower 170
Weight with all accessories but without oil or water.....500 lbs. (227 kilos)
Weight of water in engine.33 lbs. (15 kilos)
Weight per B.H.P. dry,
2.95 lbs. (1.34 kilos)
Fuel consumption..55 lbs. per H.P. per hr.
Oil consumption.....6 lbs. per hr.

Model 5A-4½

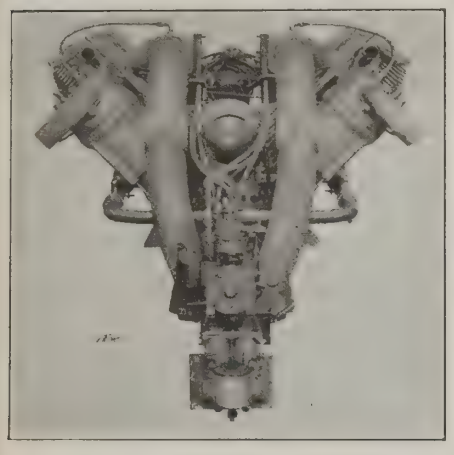
Bore.....4.5" (114 mm.)
Stroke.....5.5" (140 mm.)
Displacement.....700 cu. in.
Number of cylinders.....8
Arrangement of cylinders.....90°-"V"
Cooling,

Water circulation by centrifugal pump

Cycle 4-stroke
Ignition,
Two 8-cylinder high-tension magnetos
Magnetos....Two 8-cylinder high-tension
Carburetors,
Zenith. Water-jacketed manifolds
Oiling system,
Dry sump, complete forced feed
Normal engine speed.....2,250 R.P.M.
Propeller speed .....1,350 R.P.M.
Rated horsepower 210
Maximum horsepower 240
Weight with all accessories but without oil or water.....480 lbs. (218 kilos)
Weight of water in engine,
28 lbs. (12.7 kilos)
Weight per B.H.P. dry..2 lbs. (.91 kilos)
Fuel consumption..55 lbs. per H.P. per hr.
Oil consumption.....8 lbs. per hr.

Cylinders

Cylinders are cast in pairs from an aluminum alloy and are provided with



Sturtevant with Christensen air starter

carefully fitted steel sleeves. A perfect contact is secured between cylinder and sleeve; nevertheless a sleeve can be replaced without injury to the cylinder proper. No difficulties due to expansion occur, on account of the rapid transmission of heat and the fact that the sleeve is always at a higher temperature than the cylinder. A moulded copper asbestos gasket is placed between the cylinder and the head, permitting the cooling water to circulate freely and at the same time insuring a tight joint.

Cylinder Heads

Cylinder heads are cast in pairs from an aluminum alloy and contain ample water passages for circulation of cooling water over the entire head. Trouble due to hot valves is thereby eliminated, a most important consideration in the operation of an aeroplane engine. The water jacket of the head corresponds to the water jacket of the cylinders, and large openings in both allow unobstructed circulation of the cooling water. The cylinder heads and cylinders are clamped to the base by means of six long bolts.

Valves

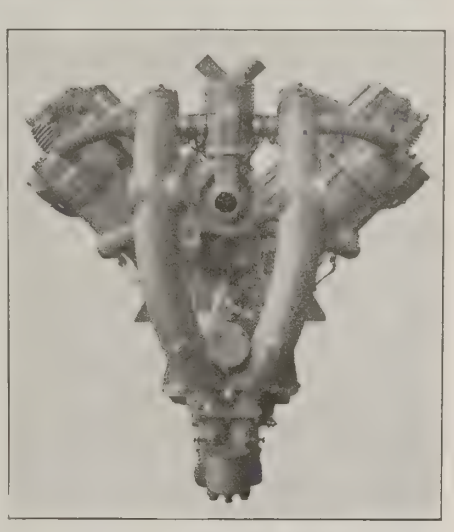
Valves located in the cylinder heads are mechanically operated. The valves and valve springs are especially accessible and of such size as to permit high volumetric efficiency. The valves are constructed of hardened tungsten steel, the heads and stems being made of one piece. The valve rocker arms located on the top of the cylinder are provided with adjusting screws. A check nut enables the adjusting screw to be securely locked in position, once the correct clearance has been determined. The rocker arm bearings are adequately lubricated by an oil wick and reservoir. Cam rollers are interposed between the cams and the push rods in order to reduce side thrust on the push rods.

Valve Springs

Valve springs are of unique Sturtevant design, made of the finest alloy steel, and subjected to an elaborate heat treatment. The springs are of extremely large diameter and operate under low stress. Liability of valve-spring failure has been reduced to a negligible point.

Pistons

Pistons made of special aluminum alloy are deeply ribbed in the head for cooling and strength, and provided with two piston rings. These pistons are of exceed-



Rear view of the Sturtevant Model 5A-4½, 210 H.P. engine, showing thermostat, pump, and carburetor

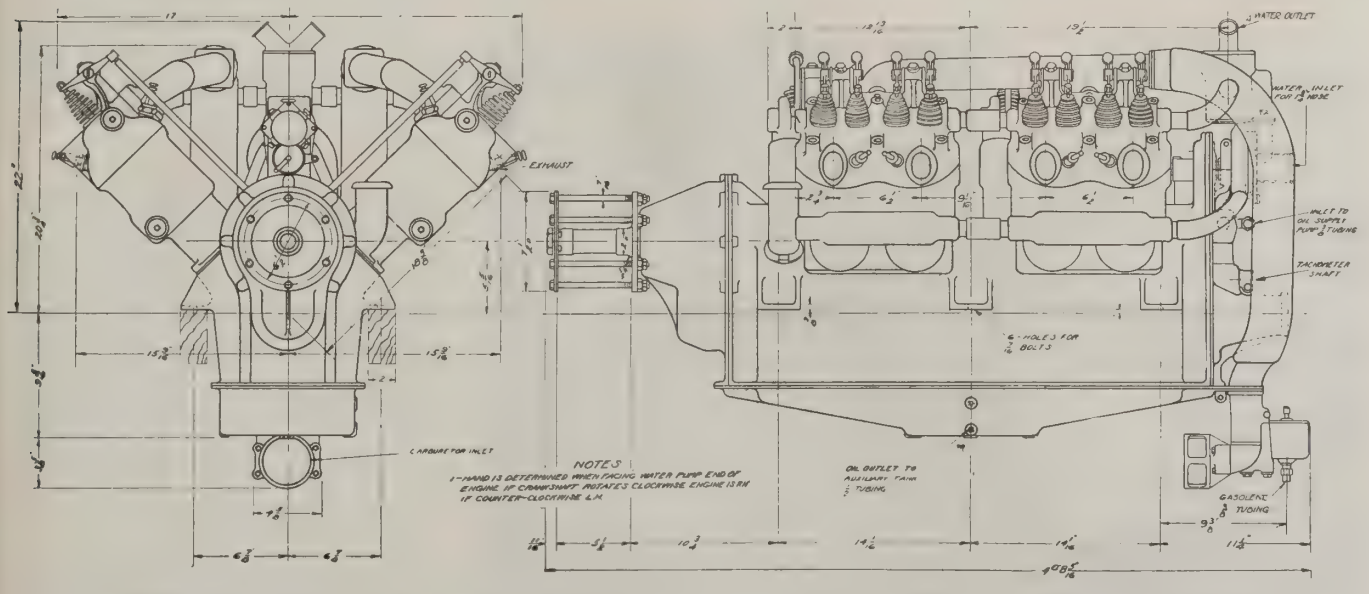
ingly light weight in order to minimize vibration and prevent wear on the bearings. The piston pin is of hardened chrome nickel steel, bored hollow. It is allowed to turn, both in piston and connecting rod. The piston rings are of special Sturtevant design, developed after years of experimenting in aeroplane engines.

Connecting Rods

Connecting rods are of "H" section machined all over from forgings of a special air-hardening chrome nickel steel. The steel, after being heat treated, has a tensile strength of 280,000 pounds per square inch. Rods are consequently strong and yet unusually light and, being machined all over, are of absolutely uniform section, giving as nearly perfect balance as can be obtained. Big ends are lined with white metal and the small ends are bushed with phosphor bronze. Connecting rods are all alike and take their bearings side by side on the crankpin, the cylinder being offset to permit of this arrangement.

Crankshaft

The crankshaft is machined from the highest grade chrome nickel steel heat



Outline Dimensions Sturdevant Model 5A-4½, 210 H.P. Engine and Model 5A, 140 H.P. Engine

treated in the Sturtevant furnaces in order to obtain the best properties of this material. The shaft is 2¼" (57 mm.) in diameter, bored hollow throughout to insure minimum weight with maximum strength. It is carried in three large bronze-backed, white metal bearings. A new method of producing these bearings insures a perfect bond between the two metals and eliminates breakage.

Base

The base is cast from an aluminum alloy. Strength and rigidity are combined with light weight. The sides extend considerably below the center line of the crankshaft, providing an extremely deep section. At all highly stressed points, deep ribs are provided to distribute the load evenly and eliminate bending.

Sump

The lower half of the base is of cast aluminum alloy of extreme lightness. It collects the lubricating oil and acts as a small reservoir for same. An oil filtering screen of large area covers the entire surface of the sump. A small pad is provided at one end on which is mounted the double-gear oil pump.

Propeller Shaft

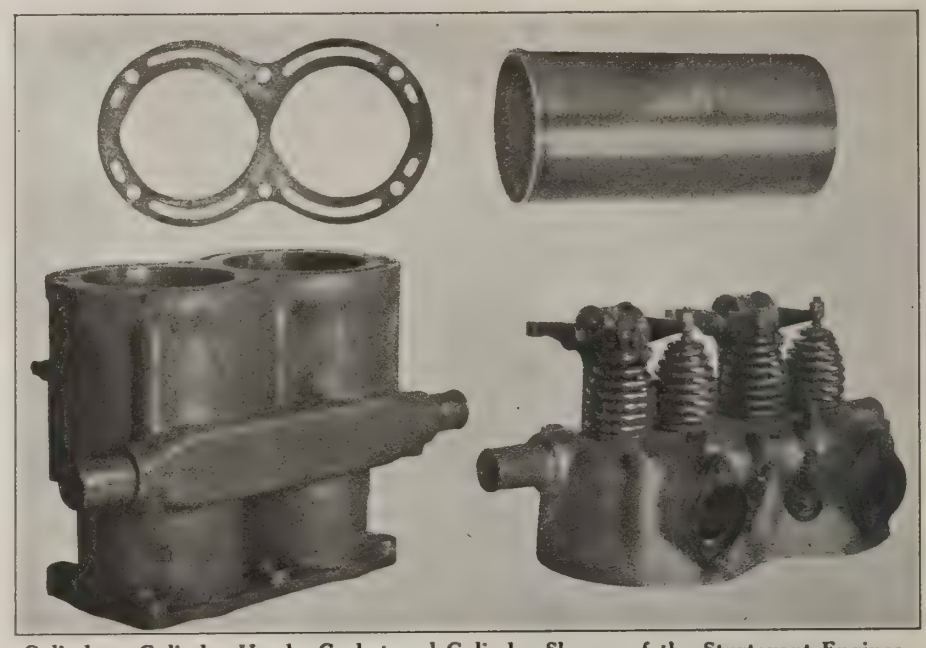
The propeller shaft is carried on two large annular ball bearings and driven from the crankshaft by hardened chrome nickel steel spur gears. These gears are contained within an oil-tight casing integral with the base on the opposite end from the timing gears. A ball thrust bearing is provided on the propeller shaft to take the thrust of a propeller or tractor, as the case may be.

Camshaft

The camshaft is contained within the upper half of the base between the two groups of cylinders and supported in six aluminum bearings. It is bored hollow throughout. Cams are formed integral with the shaft and ground to the proper shape and finish. An important development in the shape of cams has resulted in a maintained increase of power at high speeds. The gears operating the camshaft, magneto, oil and water pumps are contained within an oil-tight casing and operate in a bath of oil.

Lubrication

Lubrication is of the complete forced circulating system, the oil being supplied to every bearing under high pressure by a rotary pump of large capacity. This is operated by gears from the crankshaft. The oil passages from the pump to the main bearings are cast integral with the base, the hollow crankshaft forming a passage to the connecting-rod bearings and the hollow camshaft distributing oil to the camshaft bearings. The entire surface of the lower half of the base is covered with a fine mesh screen through which the oil passes before it is recirculated. A scavenging pump draws oil from the sump as rapidly as it accumulates and delivers it to an outside reservoir which may be of any desired capacity.



Cylinders, Cylinder Heads, Gasket and Cylinder Sleeves of the Sturtevant Engines

Carburetor

A Zenith duplex type carburetor is used. It is of a double-barrel design with one float chamber and two jets, each supplying one group of four cylinders. It is located on the rear end of the engine beneath the level of the base, permitting of gravity fuel feed, and connected to the cylinders by means of special, water-jacketed aluminum manifolds, the water jackets being cast integral. This type of manifold not only provides the cylinders with an homogeneous mixture, but increases materially the fuel economy. There is less carbon formed in the cylinder, and the exhaust is noticeably clean. The carburetion is entirely unaffected by outside temperature changes, the latter being of great importance at high altitudes.

An overhead type of carburetor installation can be supplied. In this case two single-barrel carburetors are used, one for each bank of cylinders. They are located in an accessible position between the cylinder blocks, are attached directly to water-jacketed intake manifolds, and have interconnected throttles.

Carburetor Altitude Compensator

The Sturtevant Automatic Altitude Compensating device for the carburetor is another important feature, which was developed and perfected through two years of constant experimentation. The function of the compensator is to regulate the amount of fuel entering the cylinders in accordance with the density of the atmosphere. The effect of this device, besides maintaining smooth running of the engine, is to decrease the fuel consumption at high altitudes. Actual tests indicate a fuel saving of approximately 50 per cent. at extremely high altitudes. Uniform mixture and engine temperature insure maximum engine speed and maximum power at all altitudes.

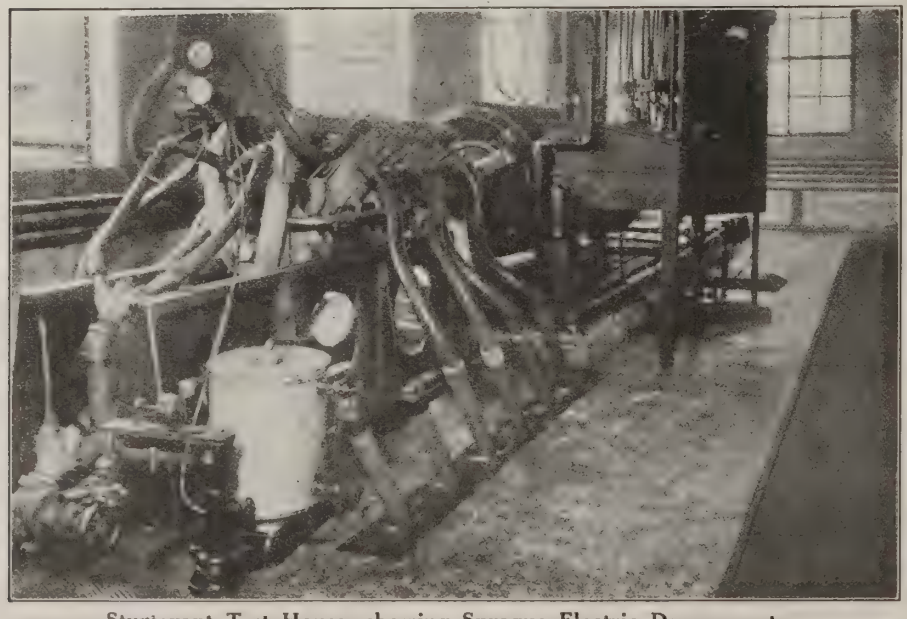
Ignition

Ignition is accomplished by two reliable eight-cylinder waterproof magnetos placed face to face between the two groups of cylinders in a most accessible position. Each cylinder is provided with double ignition by means of two spark plugs located in water-cooled bosses on the sides of the cylinder heads. This feature not only increases the reliability of the engine operation, but in addition tends to improve operation and power at high speeds. The magnetos are synchronized by a vernier coupling, allowing most accurate adjustment.

Cooling

The water circulation is accomplished by a centrifugal pump which delivers a large quantity of water through the cylinder jackets and maintains a uniform tem-

(*Continued on page* 556)



Sturtevant Test House, showing Sprague Electric Dynamometer

THE B. R. I AND B. R. II AERO ENGINES

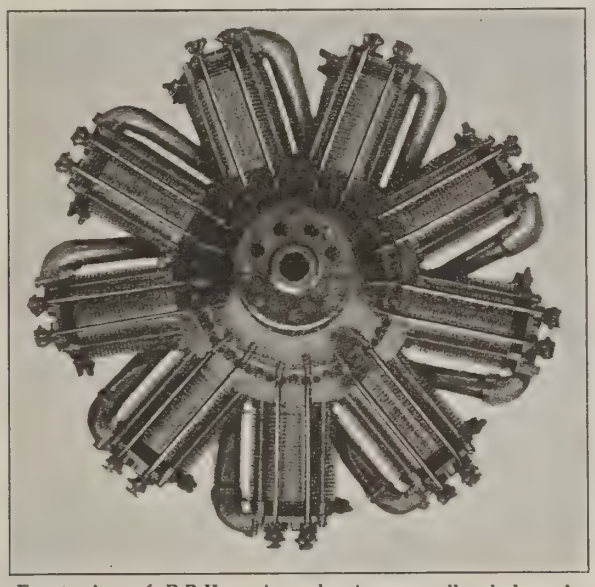
THE B. R. 1 and B. R. 2 aero engines produced by Humber, Ltd., Coventry, were designed by Capt. W. O. Bentley, M.B.E. The Humber Co. were the first to take up the building for the B. R. 1 engine, which was developed while Captain Bentley was at their works, and considerably improved upon. The result of these improvements was the B. R. 2 engine. This was originally manufactured by the Humber Co., but later, owing to the success of the engine, other companies were engaged in its manufacture.

In the early days of the war, when the French Clerget rotary engine was very much in favor, it occurred to Capt. Bentley that some improvement might be made in this, and the result was the designing by him of the B. R. 1. Capt. Bentley saw the vital importance of weight in this engine, and it is interesting to note that, where in the case of the French engine steel cylinders were used, th principle of the B. R. engine is an aluminium cylinder shrunk on to a steel liner, with an aluminium piston, the result naturally being a very much lighter engine with consequent increased efficiency.

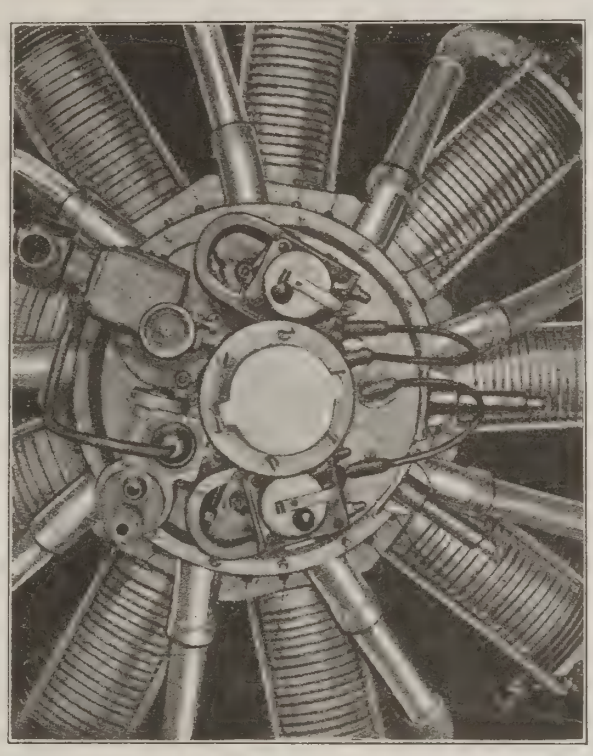
This engine, a nine-cylinder rotary type, was used principally for scouting purposes, and became very much sought after by the best flying men in the Royal Air Force. Perhaps the most notable achievement of any machine fitted with the B. R. 2 engine was the bringing down of the famous German, Baron Richthofen, by the Canadian airman, Captain A. R. Brown, who was at the time using a Sopwith "Camel" scouting plane. The following wire, received by Humber, Ltd., on that occasion from the Air Ministry, is naturally prized as a curiosity:—"Boyd Cable wires from the Front: Inform Humbers famous star fighter, Baron von Richthofen, the Red Hun, crashed to-day in our lines by a B. R. 2 engine scout."

The detail measurements, etc., of the B. R. 1 and B. R. 2 engines are given below:

Rotary Engines.	B. R. 1	B. R. 2
Number of cylinders	9	9
Bore	120 mill.	140 mill.
Stroke	170 mill.	180 mill.
Cubic capacity	1922.65 c.c.	2770.83 c.c.
Normal b.h.p.	150	250
Normal speed	1,250	1,250
Weight per b.h.p.	2.67 lb.	1.9 lb.
Fuel consumption	11 g.p.h.	20 g.p.h.
Oil consumption	12 pints per hour	16.5 pints per hour



Front view of B.R.II engine, showing propeller hub and tappet gear



Rear portion B.R.I engine, showing magnetos, oil pump, air pump and gun-firing tappets

THE "UNION" AND "LIBERTY" MOTORS COMPARED

THE editors of AERIAL AGE have had prepared the following comparison of the "Union" and "Liberty" aero engines as a matter of historical record and interest to aeronautic engineers throughout the country. The comparison is of interest because of the efforts of two pioneer engine builders, located on opposite sides of the continent, working independently along similar lines and arriving at conclusions so nearly alike. From the data it will be seen that the two engines follow very closely the same lines. As the "Union" was designed to accommodate a larger cylinder than is at present used, the parts, consequently, have an exceptional factor of safety, which probably accounts, in a large measure, for its endurance qualities. In three conservative government tests it has set up three new endurance records.

In going over this comparison it is interesting to note that the "Union" engine was designed in September, 1915, over two years before the "Liberty" came out.

	"Liberty"	*"Union"*
GENERAL DESIGN		
Crank	Seven bearing; hollow pins and journals.	Same; with addition of radial bearing between propeller and thrust bearing.
Connecting Rods	I-beam section.	Same.
Pistons	Aluminum Alloy.	Same.
Valve Mechanism	Camshaft located above center-line of cylinder heads. "Packard" type of rocker arm used to prevent oil leakage. Seven bearings.	Same. Provision to care for oil leakage is of UNION design, rocker arm coming out of top of housing, then curving down to valve.—Same object in mind.
Water Manifolds	Water inlet and outlet manifolds connected to cylinders and pump by means of short lengths of hose, to absorb vibration.	Same.
Valve Springs	Double. Right and left helical.	Same.
Valve Cooling	Exhaust valve stem is provided with special jacketing and water leaving cylinders is drawn from about the exhaust guide, thus cooling the stem and valve.	Same.

Rocker Arm Contact	
Line contact (as compared to point contact) between rocker end and valve stem, eliminating excessive wear due to old style set-screws, which gave only a point bearing.	Same.
Cylinders	
Steel barrel, with steel water-jackets. Hold down flange located above cylinder bottom.	Same, except valve seats and passages are in a semi-steel head welded to the main cylinder forging.
Journal Studs	
To relieve crank-case of tension stresses resulting from cylinder explosions, studs holding main bearing caps terminate at upper end on top of crank-case.	Same. In addition, studs connect through short yokes to the cylinder flanges.
Ignition	
Two plugs per cylinder. Current transmitted through Kerite carried in grounded metal conduits.	Same.
Lubrication	
Force feed through hollow crank to all journals and pin bearings. Camshaft bearings and rockers similarly oiled through hollow camshaft. Dry sump with external cooling reservoir.	Same.
Carburetion	
One "Zenith" Carburetor connected to each three cylinders through water-heated manifold.	Same.
Dimensions	
Valve stem diameter	Same.
Valve lift	Same on exhaust. Inlet 1/16" less.
Cylinder flange thickness	Same.
Cylinder flange studs diameter	Same, plus four additional through studs to crank journals.
Cylinder barrel thickness	Same to 1/82" less below combustion span.
Cylinder head thickness.	1/16" greater.
Piston diameter.	¼" less.
Piston length.	1" greater.
Length to diameter ratio, 1 to 1	1.25 to 1.
Piston pin diameter	Same.
Piston pin wall thickness.	1/16" greater.
Connecting rod — type of section	Same.
Connecting rod — section, depth	1/16" greater.
Connecting rod — section, width	1/16" less.
Connecting rod — section, flange	Same.
Connecting rod — lower bushing, bronze, babbitt-lined	Same.
Connecting rod — lower bushing, thickness of babbitt	Same.
Connecting rod — inside diam. lower bushing	⅛" greater.
Connecting rod — length of lower bushing	½" greater.
Ratio, connecting rod length to crank throw, 3.49 to 1.	4 to 1
Camshaft diameter	⅛" less (for 4¾" cylinder)
Camshaft, number of journals	Same, plus radial at thrust
Crank pins, outside diameter	⅛" greater
Crank pins, inside diameter	¼" greater
Crank pins, length	½" greater
Crank journals, outside diameter	⅛" less
Crank journals, inside diameter	⅛" greater
Crank journals, length	½" greater
Crank webs, width	½" greater
Crank webs, thickness	Same
Crank webs, radius of fillets	Same

CLASSIFICATION OF LANDING FIELDS

THE War Department has issued the following memorandum concerning the classification of aeroplane landing fields:

Landing fields will be classified according to size, shape and accommodations into four classes; namely, first, second, third and fourth.

First Class Landing Field.

1. Shall conform with the general specifications as to size and shape or otherwise accepted by the Government.

2. Character of the ground must be such that will allow safe landing and take off in all kinds of weather. In case of poor drainage must have a landing cross (see specifications). If L shaped field it must have two wet weather runways corresponding to the bars of the cross for each arm of the L.

3. All approaches clear allowing for safe landing and take off.

4. Marking shall be a circle 100 feet in diameter with band 3 feet wide. Name of station and number in letters and figures 15 feet long by 3 feet wide. Number placed in Northwest corner of field.

5. The accommodations shall be:

(a) Hangar space, wind indicator, tools and other repair equipment.
(b) Supplies, gasoline, oil, water, sundry spares.
(c) Telephone communication.
(d) Transportation facilities.
(e) Attendants.
(f) Proper guard and enforcement of field regulations.

Second Class Landing Field.

1. Shall conform with general specifications as to size and shape or otherwise accepted by the Government.

2. Character of the ground must be such that will allow safe landing and take off in all kinds of weather. In case of poor drainage must have a landing cross (see specifications). If L shaped field it must have two wet weather runways corresponding to the bars of the cross for each arm of the L.

3. All approaches clear allowing for safe landing and take off.

4. Marking shall be a cross arrow with bars 3 feet wide and length shall be determined by the size of the field. Each bar shall be 90 feet long provided field allows 600 yards runway. Proportionate length or 1 to 20 if under or above that. In case of L shaped field bars shall cross each other proportionate to each arm of the L. Cross shall be placed in position, each arm indicating center of runway. Arrowheads shall point North and West. Number of station in figures 15 feet long by 3 feet wide. Number placed in Northwest corner of field.

5. he accommodations shall be:

(a) Hangar space, wind indicator with available tools and other repair equipment.
(b) Supplies, gasoline, oil, water and sundry spares.
(c) Telephone communication.
(d) Near transportation facilities.
(e) Attendants and guard available upon request.
(f) Enforcement of field regulations.

Third Class Landing Field.

1. Shall conform in general specifications as to size, shape or otherwise accepted by the Government.

2. The character of ground must be such that will allow safe landing and take off in all kinds of weather.

3. All approaches clear allowing for safe landing and take off.

4. Marking shall be a cross with bars 3 feet wide and length shall be determined by size of field. Each bar shall be 90 feet long provided field allows 600 yards runway. Proportionate length or 1 to 20 if under or above that. In case of L shaped field bars shall cross each other proportionate to each arm of the L. Cross shall be placed in position, each arm indicating center of runway. Number of station in figures 15 feet long by 3 feet wide. Number placed in Northwest corner of field.

5. Accommodations shall be:

(a) Supplies available upon request.
(b) Near city or town with available help upon request.
(c) Field regulations with available guard.
(d) Provision for informing pilots of available accommodations.

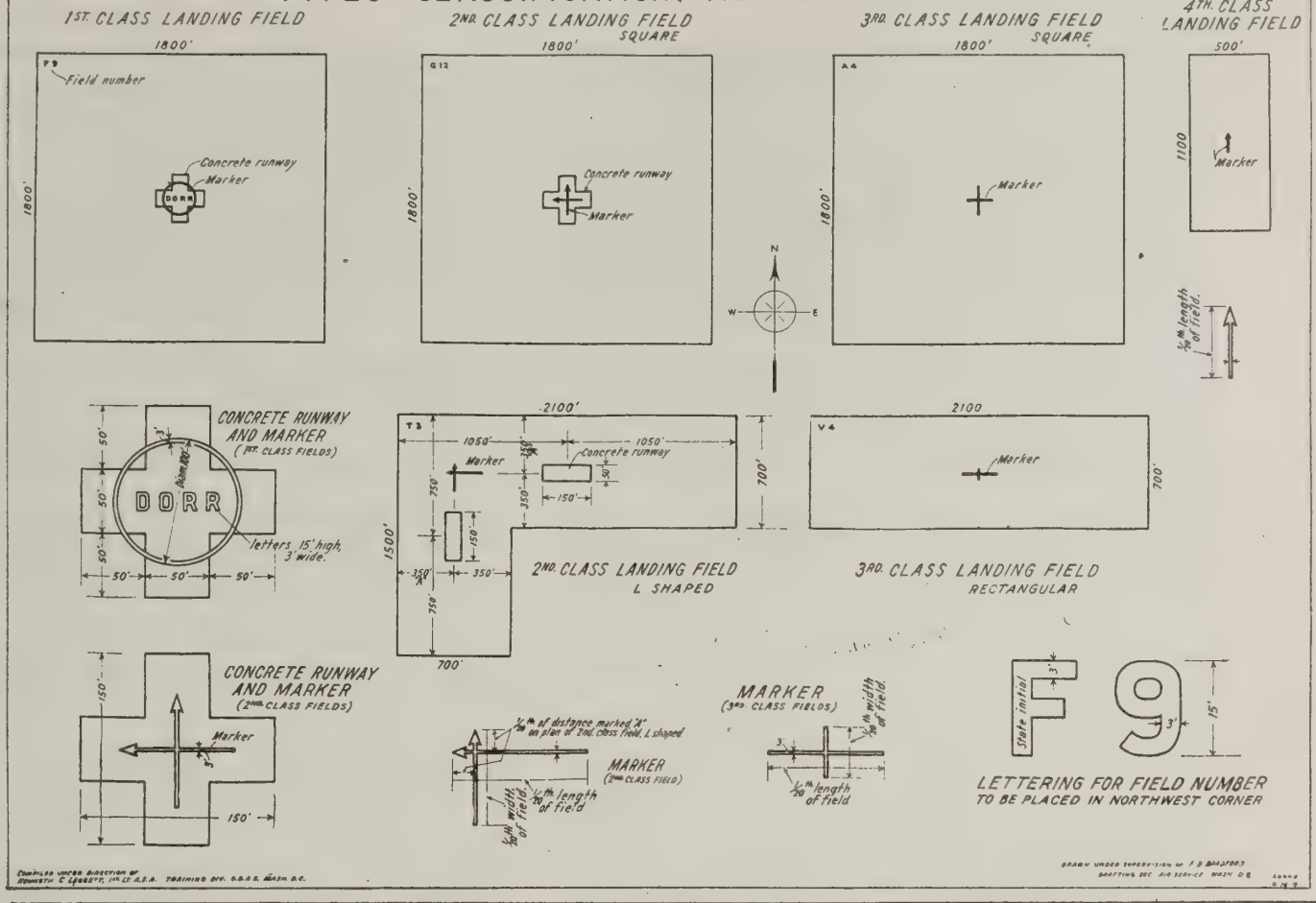
Fourth Class Landing Field.

1. Capable of landing only in emergency. Marked with single arrow indicating best approach and longest runway. Arrow 3 feet wide and length based on proportion 1 to 20 to 90 feet for 600 yards runway, supplies available or not available upon request.

It will be noted that the Atlantic City Airport is larger and better in every way than is required by government specifications for first class flying field.

LANDING FIELDS

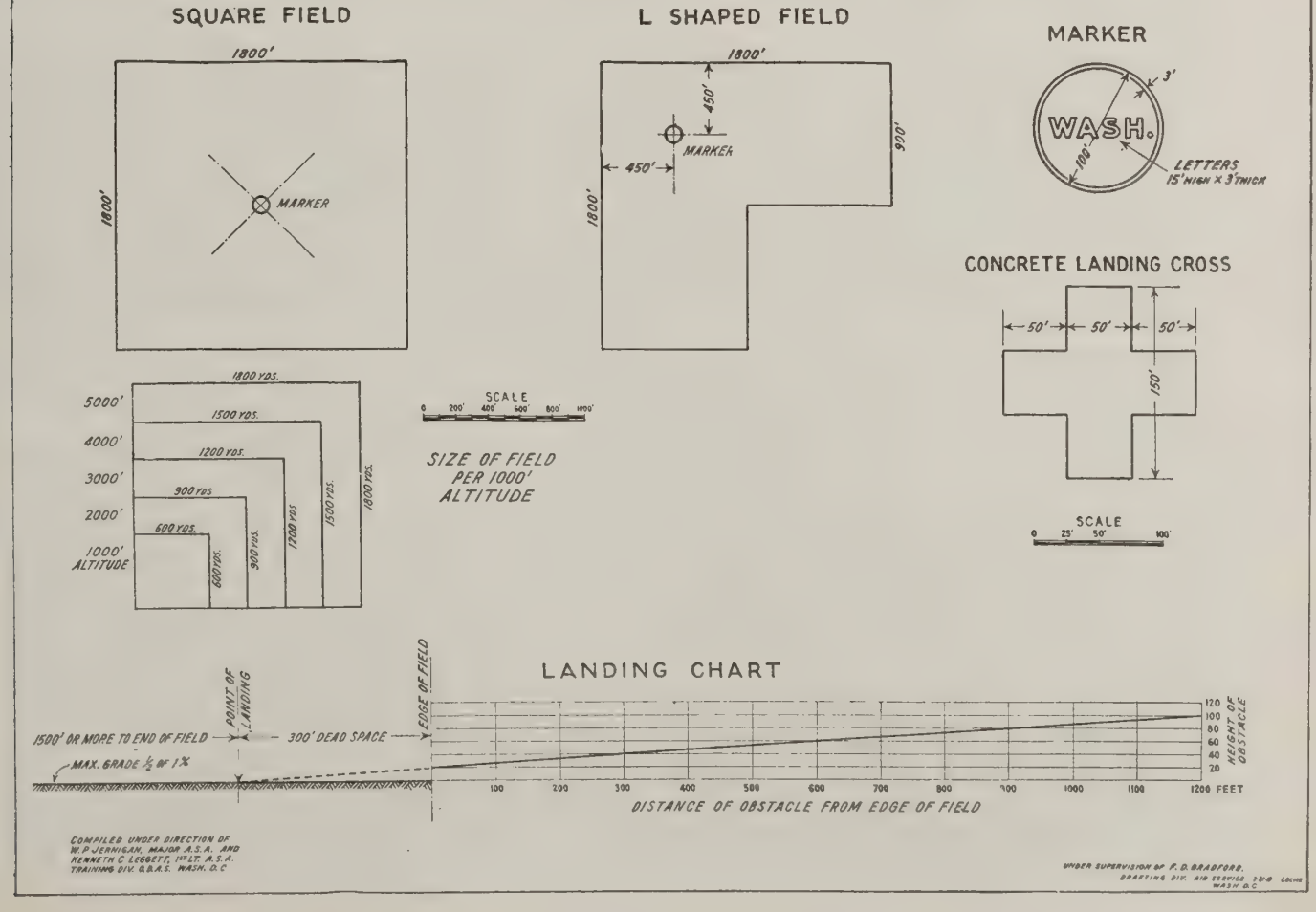
TYPES CLASSIFICATION, METHOD OF MARKING



Compiled under direction of Kenneth C. Leggett, 1st Lt. A.S.A. Training Div. G.B.A.S. Wash. D.C.

Drawn under supervision of F. D. Bradford, Drafting Sec. Air Service Wash. D.C.

SPECIFICATIONS FOR LANDING FIELDS



Compiled under direction of W. P. Jernigan, Major A.S.A. and Kenneth C. Leggett, 1st Lt. A.S.A. Training Div. G.B.A.S. Wash. D.C.

Under supervision of F. D. Bradford, Drafting Div. Air Service Wash. D.C.

CHARACTERISTICS OF LEADING AERO

(Supplementary Tables of Characteristics

ENGINE	RATED H.P.	TYPE	NO. OF CYL	BORE & STROKE M.M. B	M.M. S	INS B	INS S	MEP LBS □"	VOL IN³	VALVES PER CYL. INLET Nº	INLET LIFT INS.	EXHAUST Nº	EXHAUST LIFT IN'S.	R.P.M. & B.H.P. NORMAL R.P.M.	NORMAL B.H.P.	MAXIMUM R.P.M.	MAXIMUM B.H.P.	COMP. RATIO	FIRING ORDER	ROTATION ENGINE	ROTATION PROP
A.B.C	30	HOR.OPP	2	110	120	4.33	4.72	102		1	4.33	2	.275	1800	32	2100	38	3.8-1	1-2	R.H.T	R.H.T
A.B.C	110	RADIAL	6	110	140	4.33	5.51	105		1	4.72	2	.275	1700	110	1800	132	4.05-1	123456	R.H.T	R.H.T
BENZ	230	VERTICAL	6	145	190	5.71	7.48	113		1	4.33		.433	1400	230	1400	230	4.9-1	153624	R.H.T	R.H.T
B.R.1.	150	ROTARY	9	120	170	4.72	6.69	90		1	4.72	1	.472	1250	152	1800	171	5.3-1	135792468	R.H.T	R.H.T
B.R.2.	200	ROTARY	9	140	180	5.51	7.08	85		1	5.12	1	.512	1250	200	1800	225	5.3-1	135792468	R.H.T	R.H.T
B.H.P.(GALLOWAY)	230	VERTICAL	6	145	190	5.71	7.48	115		1	.440	2	.371	1400	239	1500	253	4.9	153624	R.H.T	R.H.T
B.H.P.(SIDDELEY)	230	VERTICAL	6	145	190	5.71	7.48	110		1	.440	2	.371	1400	243	1500	255	5-1	153624	R.H.T	R.H.T
BERLIFT(MERCEDES)	110	VERTICAL	6	120	140	4.72	5.512	118		1	.374	1	.374	1400	109	1600	124	4.3-1	153624	R.H.T	R.H.T
CURTISS OX-2	90	"V" 90°	8	101.6	127	4	5	107.3		1	.343	1	.374	1300	86	1400	92	5.4-1	12347856	EITHER	EITHER
CURTISS OX-5	90	"V" 90°	8	101.6	127	4	5	103		1	.343	1	.374	1350	91	1450	92	5.4-1	12347856	EITHER	EITHER
CURTISS V-X-	60	"V" 90°	8	127	177.8	5	7	108		1	.373	1	.374	1400	204	1500	214	4.7-1	11224433	EITHER	EITHER
CLERGET	130	ROTARY	9	120	160	4.72	6.29	85		1	.393	1	.452	1250	133	1300	145	4.5-1	135792468	R.H.T	R.H.T
CLERGET (L.S)	130	ROTARY	9	120	172	4.72	6.77	85		1	.393	1	.452	1250	149	1300	153	4.8-1	135792468	R.H.T	R.H.T
CLERGET	200	ROTARY	11	120	190	4.72	7.55	—		1	—	1	—							R.H.T	R.H.T
F.I.A.T. ATZ	260	VERTICAL	6	160	180	6.29	7.08	114		2	.437	2	.437	1600	280	1700	285	4.3-1	153624	R.H.T	R.H.T
F.I.A.T. A-14	650	"V" 60°	12	170	210	6.69	8.26	93.5		2	—	2	—	1550	650	1750	725	4.5-1		R.H.T	R.H.T
GREEN	100	VERTICAL	6	140	152	5.51	5.98	76.5		1	.315	1	.315	1300	108	1400	118	5.3-1	142635	EITHER	EITHER
GNOME	80	ROTARY	7	124	140	4.88	5.51	60.2		1	.157	1	.354	1200	67	1250	80	3.7-1	1357246	R.H.T	R.H.T
GNOME MONO.	100	ROTARY	9	110	150	4.33	5.90	88.1		—	—	1	.354	1250	107	1300	110	4.9-1	135792468	R.H.T	R.H.T
GNOME MONO.	150	ROTARY	9	115	170	4.52	6.69	108		—	—	1	.354	1400	155	1450	158	5.4-1	135792468	R.H.T	R.H.T
HISPANO(FRENCH)	150	"V" 90°	8	120	130	4.72	5.11	118		1	.393	1	.393	1600	168	1800	190	4.8-1	14234132	R.H.T	R.H.T
HISPANO	200	"V" 90°	8	120	130	4.72	5.11	112		1	.393	1	.393	2000	205	2100	212	4.8-1	14234132	R.H.T	L.H.T
HISPANO(HIGH COMP.)	200	"V" 90°	8	120	130	4.72	5.11	119		1	.393	1	.393	2000	220	2100	228	5.3-1	14234132	R.H.T	L.H.T
LIBERTY	400	"V" 45°	12	127	178	5"	7	113		1		1		1670	375	1800	420	4.9-1	—	R.H.T	R.H.T
LE RHONE	80	ROTARY	9	105	140	4.13	5.51	83.2		1	.354	1	.294	1250	91	1300	93	4.5-1	135792468	R.H.T	R.H.T
MERCEDES	240	VERTICAL	8	140	160	5.51	6.30	118		1	.450	1	.412	1350	242	1750	287	4.7-1	13248675	R.H.T	L.H.T
RAF 1A	100	"V" 90	8	100	140	3.93	5.51	81.9		1	.350	1	.273	1800	104	1800	108	4.3-1	11334422	R.H.T	L.H.T
RAF 1B	110	"V" 90	8	105	140	4.13	5.51	78.0		1	.350	1	.273	1800	110	1900	—	4.2-1	11334422	R.H.T	L.H.T
RAF 3A	200	"V" 60	12	111.3	139.7	4.3	5.5	106.4		1	.433	1	.365	1750	238	1900	252	4.8-1	114226633355	R.H.T	L.H.T
RENAULT	80	"V" 90°	8	105	130	4.13	5.11	81.6		1	-	1	-	1800	103	1900	105	4.1-1	11334422	R.H.T	L.H.T
RENAULT	150	"V" 50°	8	125	150	4.92	5.90	115.3		1	.393	1	.393	1400	178	1500	183	4.3-1	115374826	L.H.T	L.H.T
RENAULT	190	"V" 50°	8	125	150	4.92	5.90	111.8		1	.393	1	.393	1550	192	1600	—	—		L.H.T	L.H.T
RENAULT	240	"V" 50°	12	125	150	4.92	5.90	110.0		1	.393	1	.393	1400	271	1500	286	4.3-1	1353462244	R.H.T	R.H.T
ROLLS-ROYCE	75	VERTICAL	6	101.6	157.4	4	6	106		1	.324	1	.324	1600	93	1700	94	5.5-1	142635	L.H.T	L.H.T
ROLLS-ROYCE EAGLE 5	275	"V" 60°	12	114.3	165.1	4.5	6.5	109		1	.439	1	.439	1800	307	1900	315	4.9-1	(1643	EITHER	EITHER
ROLLS-ROYCE EAGLE 6	300	"V" 60°	12	114.3	165.1	4.5	6.5	111		1	.439	1	.439	1800	320	1900	327	4.9-1	R 2561	"	"
ROLLS-ROYCE EAGLE 7	300	"V" 60°	12	114.3	165.1	4.5	6.5	111		1	.439	1	.439	1800	320	1900	327	4.9-1	(3452	"	"
ROLLS-ROYCE EAGLE 8	360	"V" 60°	12	114.3	165.1	4.5	6.5	125		1	.482	1	.482	1800	354	1900	360	5.3-1	(1254	"	"
ROLLS-ROYCE HIGH LIFT VALVES	360	"V" 60°	12	114.3	16.5.1	4.5	6.5	129		1	.499	1	.499	1800	365	1900	372	5.3-1	L 3165	"	"
SUNBEAM- ARAB	200	"V" 90°	8	120	130	4.72	5.11	110		1	.354	2	.354	2000	208	2100	224	5.3-1	(2346	R.H.T	R.H.T
SUNBEAM-MOHAWK	225	"V" 60°	12	90	150	3.54	5.90	117.5		1	.373	1	.373	2100	220	2200	225	6.0-1	"	"	"
SUNBEAM-GHURKA	240	"V" 60°	12	100	150	3.93	5.90	117.5		2	.373	2	.373	2000	240	2100	260	6.0-1	"	"	"
SUNBEAM-MADRI	250	"V" 60°	12	100	135	3.93	5.31	128		2	.354	2	.354	2100	270	2200	280	5.2-1	"	EITHER	EITHER
SUNBEAM-COSSACK	320	"V" 60°	12	110	160	4.33	6.29	123		2	.354	2	.354	2100	350	2200	364	5.0-1	"	"	"
SUNBEAM-VIKING	450	3 SETS 6 CYL. 40°	18	110	160	4.33	6.29	114		2	.354	2	.354	1800	450	1900	500	5.0-1	—	"	"

NES USED IN ALLIED NAVAL AIRCRAFT

(the March 3, 1919, issue of Aerial Age)

ION STD	COOLING	CARBURETOR		MAGNETO		OIL PUMP		WATER PUMP		AIR PUMP		WEIGHT OF ENGINE IN LBS	OIL TO BE USED	MACHINES IN WHICH ENGINES ARE USUALLY FITTED	SPARK PLUGS USED.
OIL		TYPE	Nº	TYPE	Nº	TYPE	Nº	TYPE	Nº	TYPE	Nº				
1	A	A.B.C	1	TBA M2	1	GEAR	1	—		—		85	PHAR. CASTOR	R.N.A.S.	K.S.
2	A	A.B.C	2	M-6-CYL.	1	PLUNGER	1	—		—		194	PHAR. CASTOR	MC-FLYING OFF DECKS	K.S.
34	W	BENZ	2	BOSCH-ZH6	2	GEAR	1	CENTRIFUG	1	—	–	848.3	—	ALBATROS SCOUT	—
4.5	A	BLOCK TUBE	1	ADS-ML	2	PLUNGER	1	—		PLUNGER	1	410	PHAR. CASTOR	SOPWITH CAMEL	K-L-G-F9
	A	BLOCK TUBE	1	PLR-ML	2	PLUNGER	1	—		PLUNGER	1	485	PHAR. CASTOR	SOPWITH EXPERIMENTAL	
44	W	48Z	2	EM-6	2	GEAR	1	CENTRIFUGAL	1	PLUNGER	1	685	VACUUM BB	D.H.4 (RFC)	K-L-G-F7
2.5	W	Z	2	EM-6	2	GEAR	2	CENTRIFUGAL	1	SPRING	1	645	VACUUM BB	D.H.4 (RFC)	K-L-G-F6
4	W	Z-2FLOAT	1	BOSCHZ-U6	2	PLUNGER	1	CENTRIFUGAL	1	PLUNGER	1	485	CASTROL R	AIRSHIPS	
33	W	Z-DUPLEX	1	BERLING	1	GEAR	1	CENTRIFUGAL	1	—		385	CASTROL R	CURTISS JN4 BE 2C	SPLITDORF
33	W	Z-DUPLEX	1	BERLING	1	GEAR	1	CENTRIFUGAL	1	—		385	CASTROL R	DH6 M FARMAN	SPLITDORF
2.2	W	Z-DUPLEX	2	BERLING	2	GEAR	1	CENTRIFUGAL	1	—		695	CASTROL R	CURTISS R2	SPLITDORF
4	A	BLOCK TUBE	1	A.D.5	2	PLUNGER	1	—	-	PLUNGER	1	410	PHAR. CASTOR	SOPWITH CAMEL	K.L.G. F8
4	A	BLOCK TUBE	1	A.D.5	2	PLUNGER	1	—	-	PLUNGER	1	410	PHAR. CASTOR	SOPWITH TRIPLANE	K.L.G. P2
–	A	BLOCK TUBE	1	A.D.5	2	PLUNGER	1	—	-	PLUNGER	1	–	PHAR. CASTOR	SOPWITH EXPERIMENTAL	
8	W	FIAT DUPLEX	1	SIEMENS	2	GEAR	3	CENTRIFUGAL	1	PLUNGER	1	910	CASTROL R	D.H.4 H.P. AIRSHIPS	LODGE-3PT
1.6	W	FIAT DUPLEX	2	DIXIE	4	GEAR	2	CENTRIFUGAL	1	PLUNGER	1	1595	CASTROL R	— —	—
6	W	Z-D.E.F.	2	DIXIE	1	GEAR	1	ROTARY	1	—	-	475	VACCUUM BB	AIRSHIPS	K.L.G.
1.5	A	GNOME STD	1	A.D.S.	1	PLUNGER	1	—	-	—	-	215	PHAR. CASTOR	AVRO-BRISTOL SCOUT	APOLLO 5A
3.0	A	NONE STD	1	A.D.S.	1	PLUNGER	1	—	-	PLUNGER		310	PHAR. CASTOR	AVRO-BRISTOL SCOUT	APOLLO 5A
.29	A	NONE STD	1	A.D.S.	1	PLUNGER	1	—	-	PLUNGER	1	330	PHAR. CASTOR	SOPWITH CAMEL	APOLLO 5A
0	W	Z-DUP-4B-DC	1	S.E.V.	2	ECCENTRIC VALVE	1	CENTRIFUGAL	1	PLUNGER	1	455	PHAR. CASTOR	W&T-F BOAT	K.L.G. F7
8	W	Z-DUP-4B-DC	1	VICTRIX DIXIE	2	ECCENTRIC VALVE	1	CENTRIFUGAL	1	PLUNGER	1	515	PHAR. CASTOR	SOP-DOLPHIN-ADF BOAT	K.L.G. F7
1	W	Z-DUP-4B-DC	1	B.T.H.	2	ECCENTRIC VALVE	1	CENTRIFUGAL	1	PLUNGER	1	515	PHAR. CASTOR	"NT-TWIN F" BOAT	K.L.G. F7
5	W	Z-U.S.52	2	DELCO-DUAL	-	GEAR	3	CENTRIFUGAL	1	—	-	820	MOBILE "B"	DH4-HANDLEY PAGE-LEPERE	AC TITAN
5	A	BLOCK TUBE	1	A.D.S	1	PLUNGER	1	CENTRIFUGAL	–	NONE	–	260	PHAR. CASTOR	SB-3D-SOPWITH AVRO	OLEO (3PT.)
0.16	W	MERCEDES	2	BOSCH-HLS	2	DOUBLE PLUNG	1	CENTRIFUGAL	1	—	–	900	—	ALBATROSS BIPLANE	—
03	A	C.H. DUAL MH1A CUTOUT	1	AB	1	—		—	-	PLUNGER	1	440	1-3 VAC. A&B	B.E.2C & B.E.2E	LODGE (MOD A)
56	A	C.H. DUAL MH1A CUTOUT	1	AB	1	—		—	-	PLUNGER	1	495	1-3 VAC. A&B	D.H.6	K.L.G. F8
5	W	C.H. DUAL 34 MH1A	2	A6S	2	TRIPLE GEAR	1	CENTRIFUGAL	2	PLUNGER	1	780	1-3 VAC. A&B	D.H.A-C.E.I. SEAPLANE	K.L.G. F7
0	A	C.H 32-SINGL	1	AB	1	ROTARY	1	—	-	—	-	520	1-2 VAC. A&B	DH6-M. FARMAN	K.L.G. F8
0	W	Z-42 DC	1	SEY	2	ROTARY	1	CENTRIFUGAL	1	-	-	645	1-2 VAC. A&B	EAST CHURCH FARMAN	K.L.G. F5
0	W	—		SEY	2	ROTARY	1	GEAR	1	—	-	560	1-2 VAC. A&B	EAST CHURCH FARMAN. DH4	K.L.G F5
0.0	W	Z-DUP-4B-DC.	2	ZR6 WATFORD	4	GEAR	2	CENTRIFUGAL	1	PLUNGER	2	850	1-2 VAC. A&B	SHORT (184) AIRSHIPS	LONG REACH
0	W	C.H. 28 m/m	2	DIXIE	1	GEAR	2	CENTRIFUGAL	1	PLUNGER	1	410	CASTROL-R	B.E.2E AIRSHIPS	K.L.G. LODGE
0	W	C.H. 38 m/m	4	WATFORD	2	"	2	"	1	"	1	916	" "	HANDLEY PAGE DH4	" "
0	W	"	4	"	4	"	2	"	1	"	1	933	" "	"LARGE AMERICA" RIGID AIRSHIPS	" "
0	W	"	4	"	4	"	2	"	1	"	1	933	" "	WHITE CONVERTED SEAPL.	" "
0	W	R.R.C H42 m/m	2	"	4	"	2	"	1	"	1	941	" "	FAIRLEY COMPANIA	" "
0	W		2	"	4	"	2	"	1	"	1	941	" "	" "	" "
1	W	C.H. HC7	1	B.T.H. AB	2	"	3	"	1	"	1	560	PHAR. CASTOR	N.T.F. BOAT A.D.F. BOAT	K.L.G. F7
7	W	C.H. C240	4	SIEMENS	2	"	2	"	1	"	1	925	CASTROL R	SHORT 184	K.L.G. C.B
70	W	C.H. C242	4	"	2	"	2	"	1	"	1	960	" "	" "	" "
5	W	C.H. B25-38	4	"	4	"	2	"	1	"	1	830	" "	" "	" "
4.0	W	C.H. B25-42	4	WATFORD	4	"	2	"	1	"	1	1135	" "	HANDLEY PAGE	K.L.G. F6
1.6	W	"	6	"	6	"	2	"	1	"	1	1600	" "	EX. (MOTOR BOATS)	" — "

The AIRCRAFT TRADE REVIEW

Truck Repair Parts Delivered by Aeroplane

Wabash, Ind., May 10.—The first deliveries of repair parts for Service trucks were made on May 10 when two aeroplanes, operated by the Service Motor Truck Company, made a flight to Akron, Ohio. Repair parts were ordered by wire this morning by the Firestone Tire and Rubber Company for the Service trucks operated by them.

The wire was 12 minutes in transit, and 18 minutes after it was received at the Service Motor Truck Company the first plane was on its way, and the part ordered was delivered in Akron 2 hours and 45 minutes later. The distance covered was approximately 250 miles.

The Service Motor Truck Company is the first company in the United States to make use of aviation in a commercial way. They operate four Canadian JN-4 planes, which are under the control of experienced army fliers, who, in addition to delivering Service truck parts, have organized the Service Aviation, Training and Transport Company, which is training aviators, arranging for passenger flights, making express deliveries and staging exhibitions.

New Cantilever Models Being Constructed

So many demands are being made for two-seater "Bullets" that the Cantilever Aero Company of New York, has entered upon the manufacture of two new models. One will be a two-seater monoplane, the other a two-seater biplane.

Two of each of these models will be entered in the Pan-American Aeronautical Competitions at Atlantic City. Owing to the flexible wing construction and the entire absence of struts and wires, these aeroplanes are considered favorites in every event. Many college flyers are to be in this meet and are inquiring for Cantilever aeroplane knowing their great speed.

Dr. Christmas, president of the company and inventor of the flexible wing aeroplane said:

"The crucial test between the flexible wing aeroplane and the rigid wing aeroplane will come in the competitions at Atlantic City. Many of the rigid wing aeroplanes will use 300 or 400 horsepower engines with unusually large lifting surfaces and every accessory that can be put on an aeroplane to increase speed and lift, but with a small 165 horsepower engine, I look for the Cantilever Aeroplanes to break all records. Our Bullet has already made 197 miles an hour at ¾ horsepower and its good flying qualities are widely recognized.

"The new aeroplanes which we are planning will have retractable chassis—under the first retractable chassis patent ever issued in the United States. Thus with no struts, no wires, nor landing gear to affect the speed, and with a carefully designed engine and propeller, the Christmas Bullet can be expected to pass 200 miles an hour wtihout efforts and to be entirely independent of wind conditions."

American Glue 1918 Surplus Equal to $31.44 a Share

Net earnings for the American Glue Company for the year ended December 31, 1918, were $506,127, which compares with $1,893,634 for the year before.

Common dividends distributed aggregated $200,000, preferred dividends totalled $160,000, leaving a $114,317 surplus.



The Car of the C-5 is a product of the Burgess factory; the Motors were built by the Union Gas Engine Co.

Personal Pars

Victor N. Barton has resigned as mechanical engineer, Bureau of Aircraft Production, to accept the position of sales engineer with the Duplex Engine Governor Co., Brooklyn, N. Y. He will represent the company in Pennsylvania and the Southern States.

Joseph Berge, who was formerly manager of the aircraft division of the Champion Ignition Co., Flint, Mich., has been appointed chief engineer of the company.

George T. Briggs has joined the staff of the Sinclair Refining Co., Chicago, Ill., and will have charge of the sale of oil for lubricating internal-combustion engines. For the past 11 years he has been sales manager of the Wheeler-Schebler Carbureter Co., Indianapolis, Ind.

B. J. Cline has resigned as general superintendent of the aeronautic division, Nordyke & Marmon Co., Indianapolis, Ind., and vice-president and director of manufacturing in the Supreme Motors Corporation, Cleveland, Ohio, to accept the position of factory manager for the Templar Motors Corporation, Cleveland.

R. E. Clingan has resigned as Western branch sales manager of the Hess-Bright Mfg. Co., with offices at Cleveland, Ohio, and has been appointed sales manager of the Bock Bearing Co., Toledo, Ohio.

Eric S. Locke has resigned as drafting-room foreman of the Hall-Scott Motor Car Co., Berkeley, Cal. He has made no plans for the immediate future.

E. J. Hall has been discharged from the service of the Bureau of Aircraft Production with the rank of lieutenant-colonel, and has resumed his duties as vice-president of the Hall-Scott Motor Car Co., Berkeley, Cal.

Dr. Charles E. Lucke, who during the war was director of the Navy Gas Engine School at Columbia University, New York City, has been released from Government service and resumed his duties as head of the department of mechanical engineering in the university.

James W. Macpherson, who was formerly connected with the inspection section, Signal Corps, and the Bureau of Aircraft Production, as an inspector of aeroplanes and aeroplane engines, has resumed his engineering studies at Cornell University.

J. F. Richman, former superintendent and factory manager of the Cole Motor Car Co., Indianapolis, is now manufacturing manager of the Allen Motor Car Co., Fostoria, Ohio.

E. O. Sutton, treasurer of the Knox Motors Co., has been elected treasurer of the Militor Motors Co., New York City, which was recently formed by the merging of the Knox Company with the Militor Corporation.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative



PILOTS

Dana C. DeHart
Edward V. Gardner
Robert F. Shank
Ira O. Biffle
Leon D. Smith
Gilbert G. Budwig
Trent C. Fry

John A. Jordan, Superintendent, Western Division
Paul L. Ferron, Manager, Belmont Park
Harry W. Powers, Manager, College Park
Lowell S. Harding, Manager, Bustleton
O. J. Sproul, Manager, Chicago
W. J. McCandlass, Manager, Cleveland

PILOTS

E. Hamilton Lee
Lester F. Bishop
Carroll C. Eversole
Charles I. Stanton
John M. Miller
Max Miller
Charles E. Bradley

Celebrating Inauguration of Aerial Mail

The two aeroplanes that took to the air on May 15, one leaving Washington and one leaving New York, are the same that carried the mail a year ago and have been constantly in the service, and they are propelled by the same motors. One of these has been in the air 164 hours, flying 10,716 miles, and has carried 572,826 letters. It has cost, in service, per hour $65.80. Repairs have cost $480. The other plane has been in the air 222 hours, flying 15,018 miles, and has carried 485,120 letters. It has cost, in service, per hour $48.34. Repairs to this machine have cost $1,874.76.

The record of the entire service between New York and Washington shows 92 per cent of performance during the entire year, representing 128,037 miles travelled and 7,720,840 letters carried. The revenues from aeroplane mail stamps amounted to $159,700, and the cost of service $137,900.06.

The operation of the aeroplane mail service every day in the year except Sunday, encountering all sorts of weather conditions and meeting them successfully, has demonstrated the practicability of employing the aeroplane for commercial service. The service has been maintained throughout the year with a record of 92 per cent, gales of exceptional violence and heavy snow storms being encountered and overcome. Out of 1261 possible trips, 1206 were undertaken, and only 55 were defaulted on account of weather conditions. During rain, fog, snow, gales and electrical storms, 435 trips were made. Out of a possible 138,092 miles, 128,037 miles were flown. Only 51 forced landings were made on account of weather and 37 on account of motor trouble.

One of the lessons learned from the operation of the air mail service during the year is that the element of danger that exists in the training of aviators in military and exhibition flying is almost entirely absent from commercial flying. Second Assistant Postmaster General Praeger, in reporting to the Postmaster General the operations for the year, says that the record of the air mail service, which includes flying at altitudes of as low as 50 feet during periods of marked invisibility, throws an interesting light on this question.

Chicago-Cleveland Air Mail Service Started

Chicago, May 15.—The Chicago-Cleveland aerial mail service was inaugurated on May 15 by successful flights in both directions.

The first 'plane left here at 9.35 o'clock, piloted by Trent C. Fry. It was a machine of the De Haviland 4 type, carrying a mail bag weighing 450 pounds. It arrived in Cleveland at 12.48 p. m., making the trip from Chicago in three hours and thirteen minutes, including a five-minute stop at Bryan, Ohio.

The 'plane which left Cleveland at 10.30 o'clock, piloted by Edward Gardner, took the air at Woodland Hills Park and followed the New York Central tracks to the West, reaching Bryan, Ohio, at 11.15 and South Bend at 12.40 o'clock. It arrived in Chicago at 1.25 p. m. The trip consumed three hours and fifty minutes.

PERFORMANCE OF AVIATORS FOR THE YEAR, MAY 15, 1918—MAY 15, 1919

Pilot	Perfect Flights		Forced Landings		Total	
	No.	Miles	Interrupted Flights	Uncompleted Flights	No.	Miles
Lt. J. C. Edgerton	52	7,020	1	0	53	7,155
Lt. Stephen Bonsal	39	4,680	1	4	44	5,025
Lt. Walter Miller...	48	4,590	2	2	52	4,960
Lt. T. H. Webb....	41	3,690	1	0	42	3,780
Lt. E. W. Killgore..	39	5,175	3	2	44	5,670
Lt. H. P. Culver...	35	3,375	2	0	37	3,645
Lt. G. L. Boyle....	0		0	2	2	114
Lt. Gordon Dodge..	9	1,035	2	2	13	1,485
Max Miller.....	82	9,242	0	0	82	9,242
Dana C. De Hart..	179	20,324	7	5	191	21,360
Edw. V. Gardner..	97	10,858	3	2	102	11,422
Robert F. Shank...	129	13,700	4	5	138	14,334
M. A. Newton.....	73	7,634	1	2	76	7,873
Dunn K. Steele....	5	506	2	3	10	859
Louis Gertson.....	4	436	0	0	4	436
Leon D. Smith....	67	7,314	2	13	82	8,292
Lawton V. Smith..	45	4,866	0	2	47	4,926
Lester F. Bishop...	3	346	0	1	4	354
John M. Miller....	4	368	0	0	4	368
Chas. I. Stanton...	2	218	0	0	2	218
Lyman Doty.....	3	308	0	2	5	369
Trent C. Fry.....	7	724	0	2	9	774
Irving Graeb.....	3	308	0	2	5	489
Ira O. Biffle.....	39	4,194	0	12	51	8,753
Lowell S. Harding.	6	654	0	0	6	654
E. Hamilton Lee...	61	7,758	2	2	65	8,121
Chas. E. Bradley..	26	3,924	2	1	29	4,172
Wm. W. Harrison..	1	90	0	0	1	90



Celebrating one year of successful aerial mail service at Washington. From left to right: Asst. Postmaster Otto Praeger, Brig.-Gen. L. E. O. Charlton, British Aerial Attaché; Postmaster-General Burleson and General Chas. T. Menoher

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

CRI—Report to Chanute Field, Rantoul, Illinois.
EOT—Report to Ellington Field, Olcott, Texas.
ELA—Report to Eberts Field, Loanoke, Arkansas.
LDT—Report to Love Field, Dallas, Texas.
RSD—Report to Rockwell Field, San Diego, California.

Notes

Note 1—Report to places mentioned in order named.
Note 2—Report to U. S. Army General Hospital No. 12, Biltmore, N. C.
Note 3—Report to Camp Travis, San Antonio, Texas, for duty.
Note 4—Report to San Francisco, Calif., to Western Department for duty.
Note 5—Report to Camp Meade, Md., for assignment to overseas duty.
Note 6—Report to Army and Navy General Hospital, Hot Springs, Ark.
Note 7—Report to Columbia University, New York City, as Assistant Professor of Military Science.
Note 8—Report to Pope Field, Camp Bragg, Fayetteville, N. C.
Note 9—Report to Bureau of Aircraft Production for assignment to duty.
Note 10—Report to Director of Purchase, Storage and Traffic, Washington, D. C.
Note 11—Report to United States Army General Hospital No. 41, Fox Hills, Staten Island, N. Y.
Note 12—Report to United States Army General Hospital No. 42, Spartansburg, S. C.
Note 13—Report to Charleston, S. C., to Charleston Port Terminal for duty.
Note 14—Report to Middletown, Pa.
Note 15—Report to Richmond, Va., to Aviation General Supply Depot.
Note 16—Report to Eastern Department, New York City.
Note 17—Report to Little Rock, Ark.
Note 18—Report to Newport News, Va.
Note 19—Report to Director of Air Service, Washington, D. C.

Special Orders No. 108 to 113 Inclusive

A

Albrook Frank P.....Note 17
Andrews, William V.....Note 19
Arnold, Henry H.....Note 4
Ames, George P.....Note 5
Albright, John W.....Note 18
Ayres, Verne U.....ELA

B

Brock, William S.....Note 18
Brant, Gerald C.....Note 16
Brown, John F.....Note 15
Barker, James Roy.....Note 2
Beall, Henry I.....Note 18
Babcock, Howard C.....Note 19
Burwell, Harvey B. S.....LDT
Billiter, Earl D.....ELA
Blystone, Raymond J.....ELA

C

Cameron, Burr S.....Note 6
Collier, David C.....Note 8
Claiborne, Harry C.....EOT
Carter, James E.....Note 19
Coleman, John M.....ELA
Canfield, Dwight J.....Note 11
Coney, William D.....ELA

D

Drayton, Harry C.....Note 19
Dargue, Herbert A.....Note 13

E

Ehrlichman, Rudolph I.....TFT
Eagle, Aubrey I.....EOT
Edwards, John R.....Note 7

F

Frenna, Leo C.....Note 5

G

Grosse, Carl .....Note 19
Gill, Joseph Francis.....HHN

H

Heffley, Armor S.....CRI
Henry, William J., Jr.....Note 13
Hale, John T.....Note 18
Hamby, Ben H.....KST
Hanlon, Arthur J.....RSD

I

Icenhower, Fred J.....Note 5

M

Marsh, Ian D.....EOT
Machle, Jerome D.....CRI
Morser, Clarence W.....Note 10
Mitchell, Samuel Erskin.....Note 19
McConnell, Adolphus R.....Note 18
Morris, Edward M.....Note 8

N

Netcher, Fred .....Note 10
Newland, Phillip J.....HHN
Newmeyer, William L.....Note 8

O

O'Brien, Matthew H.....Note 5

P

Pye, Walter D.....Note 19

R

Ryan, Robert E.....ELA
Rady, William J.....Note 5
Rumney, Raymond C.....ELA

S

Slade, William .....CRI
Sutton, Sephus .....Note 14
St. Clair, Gordon C.....CRI

T

Toston, William Rufus.....Note 2

W

Wrenn, Theodore W.....FRF
Webb, William H.....Note 12
Woodleton, Royal B.....CRI

Y

Yound, Russell A.....Note 18



Three famous aeronauts meet for the first time at the Aero Club of Dayton. Left to right: Orville Wright, Capt. Eddie Rickenbacker and Major Schroeder

Recent Naval Orders

Lieutenant (junior grade) Charles B. Dushane, to duty naval air station, Pensacola, Fla.

Lieutenant (junior grade) M. E. Jensen, to duty commanding officer U. S. N. Aviation Repair Base, Queenstown, Ireland, in connection nucleus crews.

Lieutenant Henry U. Linkins, to duty Naval Air Station, San Diego.

Lieutenant Augustus M. Baldwin, to duty air station, Miami, Florida.

457 Loops with Passenger New World's Record

Washington, May 19.—According to a statement issued by the Department of Military Aeronautics a new world's looping record was established at Carlstrom Field by Lieutenant Ralph J. Johnson, who has many unrecorded stunts to his credit. He was accompanied by Second Lieutenant Mark R. Woodward as a passenger. Johnson made 457 continuous loops in his Lapere Fighter in one hour fifty-four minutes and ten seconds. His elevation varied from 6,000 to 4,000 feet.

Flying Fields to be Retained

Fifteen flying fields and five balloon schools are to be held by the Air Service as permanent training fields.

FLYING FIELDS

"Government Owned"

Rockwell Field, San Diego, Cal.; Langley Field, Hampton, Va.; Post Field, Fort Sill, Okla.; Kelly Field, No. 1, San Antonio, Texas.

"Leased—to be purchased"

March Field, Riverside, Cal.; Mather Field, Sacramento, Cal.; Carlstrom Field, Arcadia, Fla.; Door Field, Arcadia, Fla.; Ellington Field, Houston, Texas; Park Field, Millington, Tenn.; Souther Field, Americus, Ga.; Selfridge Field, Mt. Clemens, Mich.; Scott Field, Belleville, Ill.; Chanute Field, Rantoul, Ill.; Kelly Field, No. 2, San Antonio, Texas.

Balloon Schools

"Government Owned"

Balloon School, Lee Hall, Va.; Balloon School, Ft. Crook, Nebr.

"Leased—to be purchased"

Balloon School, Arcadia, Cal.; Balloon School, San Antonio, Tex.; Balloon School, Ft. Omaha, Nebr.

U. S. Navy Will Release All Temporary Officers

Washington, May 13.—All temporary officers who entered the navy for the war period only will be released within the next few weeks, Acting Secretary Roosevelt announced today. There are more than 1,000 officers in this status and they will be replaced by reserve officers who are accepting temporary commissions with the agreement to remain in the service until six months after peace is declared.

Figures for Manufacture of Service and Training Planes for Allies Given Out

(Prepared by Statistics Branch, General Staff, War Department)

Data for the plane production of France, Great Britain, and Italy for the period January 1 to October 1, 1918, show that service planes constitute 79 per cent and training planes 21 per cent of the total.

The following table shows the production and percentage distribution for each of the principal Allied countries:

Country	Service Planes	Training Planes	Total	Per Cent Service	Per Cent Training
Italy	2,507	421	2,928	86	14
France	15,326	3,507	18,833	81	19
Great Britain	17,854	5,655	23,509	76	24
Total	35,687	9,583	45,270	79	21

Army Issues Call For Flight Surgeons

Washington, D. C.—The Air Service now requires that a flight surgeon be detailed at each of its 15 active fields.

Owing to the discharge of a large number of temporary medical officers, the Air Service needs a number of medical officers of the permanent establishment as flight surgeons. Medical officers below the grade of lieutenant-colonel, who desire duty of this character, should communicate with the Chief Surgeon, Air Service, Washington, D. C., who will fill vacancies from among those who volunteer. Authority has been granted medical officers to become pilots if they pass the necessary physical qualifications and as such receive the 25 per cent. flying pay.

Air Service Demobilization

The net decrease in the total commissioned and enlisted strength from the date of the armistice to April 17 was 69 per cent.

The following table shows the present distribution of personnel as compared with November 11, and per cent of net decrease. The April 17 figures do not include 514 men at demobilization camps awaiting discharge.

	Nov. 11	Apr. 17	Per cent net decrease
Cadets	5,775	824	86
Officers	20,586	6,220	70
Enlisted men	164,266	51,384	69
Total	190,627	58,428	69

69 Per Cent of Present Air Service Personnel Overseas

During the week ended April 17, 1919, the Air Service personnel overseas decreased 424 men as against a weekly average of 2,268 during the nine preceding weeks. The strength of the Air Service in the United States and overseas is shown for various dates in the following diagram:

	U. S.	Overseas
Nov. 11	111,846	78,786
Dec. 2	115,216	78,061
Dec. 26	99,010	59,917
Jan. 30	46,919	57,527
Feb. 27	33,649	53,087
Mar. 28	25,347	41,800
Apr. 10	20,636	40,855
Apr. 17	17,753	40,431

THE PROBLEMS WHICH CONFRONT THE AIR SERVICE

IN an address delivered before the Southern Aeronautical Congress at Macon, Ga., Major General Charles T. Menoher, Director of Air Service, spoke as follows:

In order to give an idea as to the problems which confront the Air Service, and the aims and objects in view, I will quote extracts from various public utterances made in the last two months by the present Director of Air Service.

"Now that peace has come and the various activities disturbed by war are returning to normal channels, we may look for a steady flow of conservative development. We, I believe, would like to see the United States, where aviation had its birth, gain and maintain the lead in aviation. To do this will require the co-operation and co-ordination of all our activities and resources.

"Because of the lead given the Air Service of the War Department by the enforced effort due to the war, civilian activities," and in this is included all activities outside of the governmental departments, "are sure to look to the Air Service for assistance for some time to come. This places upon the Air Service an obligation of assistance and co-operation in carrying on the work. This, I believe, is a fortunate circumstance for the Air Service, provided it fulfills its obligation.

"It will be the endeavor of the Air Service to fulfill these obligations as far as possible, subject to the limitations of Congressional appropriation. The acceptance of such co-operation and assistance by civilian activities should carry with it a reciprocal obligation, and appeal is hereby made for such reciprocal obligation.

"It will be in the matter of research and development of material that we must look in the future to civilian activities, unless Congress should appropriate for this purpose more liberally than we have now reason to hope for. The Air Service must render every encouragement possible to private manufacturers to develop new and improved types and at the same time carry on its own work along these lines as far as possible. * * * Within the Air Service itself there must be an active, progressive policy. From its present position of advantage, it should be able to lead the way in most phases of air activities. It should never be content to simply maintain its existence."

Again, "Of the many problems pressing for solution in the general field of aeronautics, the most urgent is that of proper and adequate rules and regulations for the navigation of the air. First and foremost among these rules should be those covering matters of qualifications

(*Continued on page* 554)



New York's Aerial Police Aviators in front of their Curtiss plane just before making the first trial flight at Sheepshead Bay

FOREIGN NEWS

British Firm Adds $10,000 to Trans-Atlantic Prize

In order to encourage the trans-Atlantic flight, the Ardath Tobacco Company of England have added 2,000 guineas to the prize offered under the Royal Aero Club rules.

French Government Issues First Civilian License

Mdlle. Jane Herveu, who was one of the first ladies to secure a pilot's certificate, has received permission to resume flying—the first civilian, it is said, to be so honored in France since the armistice. She is at present practicing on a Caudron at Issy-les-Moulineaux.

Civilian Aviation Ban Lifted in England

London.—The Air Ministry lifted the ban on civilian flying on May 1. It was also decided to give permission for flying between the dates of April 17th and 22d, inclusive. The flights must be made from an approved aerodrome, subject to an undertaking being given that the rules of the aerodrome will be strictly observed, and will be limited to a radius of three miles from the aerodrome. Service-type machines, which have been built under the supervision of the Aircraft Inspection Department, may alone be used.

During the four days' civilian flying Handley Page pilots at Cricklewood carried 800 passengers without accident; the youngest was aged 6, the oldest 81. At Hamble, Southampton, 400 passengers were carried in Avro machines.

Afghan Rioters Quieted by Aerial Bombardment

London.—According to news dispatches dated May 12, the British have driven the Afghans from Ashrasiakhel and aeroplanes crossed the frontier and bombed the enemy position at Loidatta with good results.

Bristol Plane for Film Delivery

One successful use of the aeroplane for commercial purposes is that of the Bristol fighter, piloted by Capt. A. M. West, R.A.F., which is engaged on delivering Harma films to various provincial towns including Manchester, Lincoln, Newcastle, Leeds, Birmingham and Glasgow. It is also being used to distribute leaflets advertising the films. The usual load is 6,000 feet of film and 30,000 leaflets.

Cortinez Recrosses Andes

The Chilean pilot, Lieut. Cortinez, who crossed the Andes in a Bristol aeroplane recently from Santiago and landed at Mendoza (Argentina), has recrossed the range on his return to Santiago, the journey occupying two hours. Lieut. Cortinez reached a height of over 20,000 feet.

Seven Airways and 120 Aerodromes for Civilian Aviation in England

London, May 14.—The commercial air stage has been officially ushered in by Great Britain.

Civilians are traveling on seven great airways, radiating from London to all parts of the United Kingdom and to points outside. One hundred and twenty aerodromes and landing stations have been placed at the disposal of commercial air traffic, thirty-four main aerodromes being opened at once.

Marine Corps Aviators Use Tear Gas Bombs on Haitian Bandits

In order to cause bandits of Haiti and Santo Domingo to surrender without the employment of large numbers of troops and unnecessary bloodshed, Marine Corps aviators have been directed to undertake a month's tear gas dropping campaign. It is anticipated that this "genteel terrorism" will so affect the natives by appealing to their superstitions and cause them to surrender without further fighting.

Permanent International Aircraft Standards Commission Being Formed

London.—The necessity for the creation of an international body, with direct government co-operation and official recognition, for the study of industrial aeronautics, and the setting up of international standards best suited to the effective and rapid construction of aircraft, was urged by the American delegates at a series of International meetings held in London in March, 1918, the opening meetings of which were addressed by Mr. Winston Churchill.

As a result, the International Aircraft Standards Commission was appointed at an international conference held in London in October last. The conference was composed of the following delegates: *British:* Sir Arthur Duckham, K.C.B. (chairman); Mr. C. V. Allen (secretary of British Aircraft Constructors); Brig.-Gen. R. K. Bagnall-Wild, C.M.G., (Aeronautical Inspection Department); Lt.-Col. C. F. Jenkins, M.B.E. (Technical Dept. Air Ministry); Captain Neal (representing the Inter-Allied Advisory Committee sitting in Paris); Col. H. W. Outram (Aeronautical Inspection Department); Col. A. Reiss (Supply Department, Air Ministry). *American:* Dr. W. F. Durand. *Canadian:* Capt. R. J. Durley, Mr. G. M. Waterman. *French:* Comm. C. Grard, Comm. C. Martinot-Lagarde, Lt. A. M. Portevin, Lt. C. Frechet. *Italian:* Capt. Bonomi, Capt. E. Ferrua, Capt. A. Rota.

The British, Canadian, French and Italian delegates were able oe report to the meeting that national committees were in process of formation in their respective countries. As regards America, owing to the fact that the Department of Aircraft Production was in a state of reorganization, no committee had been nominated.

At the October conference eleven international advisory committees were formed to study questions which appeared susceptible to internationaal agreement. Arrangements are now being made to hold in Paris in April or May next meetings of these committees, which are as follows: 1. Mechanical Tests. 2. Chemical Analysis. 3. Tolerances on Bars. 4. Magnetos. 5. Sparking Plugs. 6. Propeller Hubs. 7. Ball Bearings. 8. Axles, Hubs, Rims, Tires. 9. Electrical. 10. Steel Tubes. 11. Tests on Wood.

The British, Canadian, and French committees have nominated their representatives to attend these meetings and preliminary details are now being arranged. It would be most unfortunate if these meetings were to be held without American representation, seeing the keen interest taken by the American delegates at each conference they attended.

The objects of the commission are briefly: (1) To study and recommend industrial and technical standards best suited to the effective and rapid construction of aircraft with the maximum standardization of material specification and interchangeability of component parts and the minimum of maintenance cost; (2) to keep abreast of all inventions and progress by constant and periodic revision of the standards recommended; (3) to secure approval and government acceptance of the "International Aircraft Standards" issued by the commission.

It will be seen, therefore, that the commission has been entrusted with a task of the greatest importance, a fact which is fully realized by the Allies, for besides the countries cited above as co-operating in the work, the Japanese Government have agreed to form a committee and there is likelihood of Belgian representation shortly.

Amsterdam Aeronautical Exposition Under Auspices of Dutch Officials

Amsterdam, Holland.—During the months of July and August there will be held at Amsterdam, Holland, an international Aeronautical Exposition, under the auspices of the Chambers of Commerce of Amsterdam and Rotterdam, as well as the Secretaries of the Interior, War, Agriculture and Commerce, and of Water Works, the Governor of the Province of North Holland and the chairman of the Royal Dutch Association for Aircraft. The honorary members are some of the most prominent men in Holland in commerce, shipping and banking, and the executive committee is largely composed of members of the Royal Dutch Flying Corps. With such support the success of the exposition is practically assured. It is confidently expected that the foreign aeroplane industries will generally participate and many requests for space have already been received from moreign countries.

In addition to a large number of aeroplane exhibits, parts, materials and instruments will be displayed. Aircraft for purely military purposes will be excluded from the exhibit.

Brigadier-General Duval New French Air Chief

According to a decree of April 15th, Colonel Dhé has been replaced in the office of Directeur de l'Aeronautique Militaire by Brigadier-General Duval.

Colonel Dhé has held this office since November, 1917, and is responsible, in a large measure, for the successful unification of the French naval and military air services. He was in charge of the organization of a Department of Civil Aeronautics but owing to lack of co-operation Colonel Dhé resigned. He will devote his great capacity and experience immediately in civilian work now being organized.

Breguet, Bleriot and Caudron in Huge Aero Transport Combine

Paris.—A French corporation has recently registered under the name of the Compagnie des Messageries Aériennes, with large capitalization for the promotion of all forms of aviation in France, French colonies and abroad. Routes will be established for the carrying of mail, packages, merchandise and passengers.

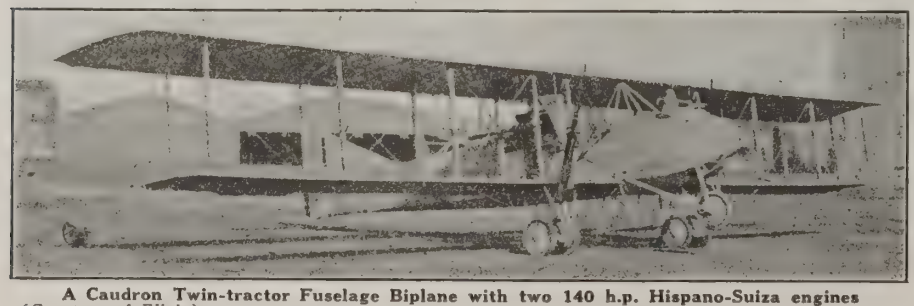
The offices of the concern are Avenue Kléber, Paris, and its first administrators are Messrs. Louis Bréguet, Louis Blériot, Réné Caudron and the Morane-Saulnier Company.

France Doubts German Commercial Aero Plans Have No War Aim

Paris, May 10—"The air should have become the property of the League of Nations," says Le Matin, in calling attention to the fact that in the peace treaty handed to the Germans no reference was made to the building and equipment of aeroplanes by Germany for civilian purposes.

"What difference is there between military and bombarding aviation and civilian flying? Civilian aviation lends itself to all sort of camouflage. A peaceful postal aeroplane or a passenger machine can easily and rapidly be crammed with explosives and armed with machine guns. In a few minutes aero stations can be transformed in huge aerial mobilization centres."

Then after pointing out the greatest danger from such transformation of aerial services for France, Le Matin puts forward the following proposition: "The League of Nations, by taking over the air police, by creating an Interallied organism for the exploitation of the air and only allowing Germany to participate in the exploitation under its control, could save the civilized world from the most redoubtable of its dangers."

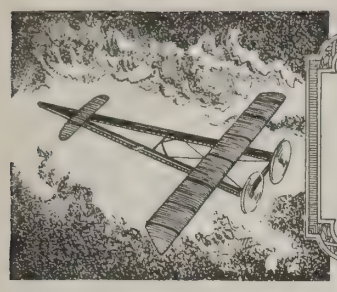


A Caudron Twin-tractor Fuselage Biplane with two 140 h.p. Hispano-Suiza engines
(Courtesy of Flight)

Aerial Progress Forced Canadian Pacific to Enter Aero Transport Field

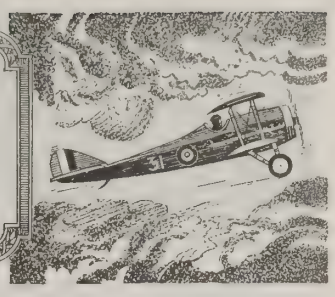
"When we consider that we are approaching a new epoch in air transportation, the Canadian Pacific Railroad's application for an air charter is only natural," is the way Grant Hall, vice-president of the road, explained it. "Progress in aviation is so rapid that it is incumbent on the C. P. R. to prepare to enter the field."

Mr. Hall pointed out that the Western prairies of Canada, with their absolute lack of fog and mist—the airman's worst enemy—offered an ideal field for profitable aerial transportation. The success of the service between Berlin and Frankfurt during two years of war and the fact that Canada is supplied with an abundance of war aviators who can be used as pilots were factors, Mr. Hall said, that insured the success of such a venture.



ELEMENTARY AERONAUTICS
and
MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W., Washington, D. C.
CORRESPONDENCE MODEL AERO CLUB
320 N. Main Street, Rockford, Ills.
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

Prizes for Model Aeroplane Contest

AERIAL AGE has decided to award two sets of medals and a beautiful cup for the coming contests, to be decided during the month of June.

These medals of gold, silver and bronze are to be awarded to the first, second and third in each racing model aeroplane event.

The cup is very neat, and the winner of the scale model construction contest will have something he will be proud of for years to come, as he will not alone possess an enviable prize, but he will be the owner of the finest model in the United States. This is an absolute fact, because some of the most expert model builders have signified their intention of competing in this event.

It makes no difference which contest is held first; the only thing necessary is to have at least five competitors in each event of the flying contests and these five competitors need not live in the same town or city, but they must compete during the same meeting.

The construction contest will be decided by the builders of such models sending in clear photographs, together with a good description of the model and how it was constructed. The best of these photos and descriptions will be used later in AERIAL AGE for the benefit of the readers.

To conduct the flying contests, it is necessary to have the flights witnessed by some influential citizens in your city or town, and if you have a branch of the Aero Club of America in your city, invite a few of the members to judge and witness the flights.

The Illinois Model Aeroplane Club and the Aero Science Club of Chicago and New York respectively will no doubt have teams in the contests, and I look for some competition between these rival clubs.

The Illinois has had the better of the New York contingent for the past couple of years, but from what Mr. S. Y. Beach of the latter club told me a few days ago, the Illinois club will have to travel some if they win any of the above prizes.

I should not be surprised to see some dark horse come through and beat the members of both of these big clubs, as I have received many photos and reports of wonderful models and their long flights from out-of-the-way places. These are the people we will no doubt hear from. The Texas boys have gained considerable knowledge since the Aviation Section opened up new fields there during the war, as have the California and Florida boys.

Readers as far off as the Hawaiian Islands are entered, so the winners will be real champions in their respective events.

The prize winners will be invited to send their photographs, holding the winning model, to the Model Editor of AERIAL AGE for publication, after which the prizes will be awarded.

We hope to have another such contest for water machines later in the summer, and owing to the difficulty of successfully launching a model from the water, these contests should be as well contested as the hand launched and R.O.G. events.

To conduct a contest successfully proceed as follows:

Have a judge for the measuring of the distance or for taking the time of flight. (If a distance contest, the distance that the models lands from the starting point is measured in a straight line, regardless of the circles the model might make.

This distance is measured with a steel tape or a cyclometer working on an accurately measured disk or wheel. This cyclometer is mounted on a forked handle, to which is fastened a wheel two feet in circumference. Two pegs directly opposite each other are fastened to the wheel in a position to strike the cyclometer and register each revolution Each revolution registers twice, thereby showing a distance of two feet.

Jennings Machine Works Announces New Catalog

The Jennings Machine Works, Uniontown, Pa., announce a new catalog for Ford Motored Aeroplane Fittings, also a full line of parts for light plane construction. They also do general machine work in the way of engine rebuilding and manufacturing of engine parts.

The fittings turned out by the above company have been examined and tested by the writer and have proven entirely satisfactory inasmuch as they follow out the designs suggested in the Ford Motored Aeroplane articles which appeared in AERIAL AGE recently. It would be worth while for any one contemplating building a Ford Motored Aeroplane or other light machine to write this company for their new price list.



The model shown in the accompanying photograph was designed and constructed by Mr. Wallace A. Lauder of Summit, N. J. This model flew a distance of 3,537 feet, when launched from hand, making a new world's record, in 1916. With the chassis attached the model has made flights of over 100 seconds each. This is the type of model that will be used in the coming contest



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

David McK. Peterson
(Major A. S. (M. A.) D. S. O.
Killed in Aeroplane, Daytona, Florida
March 16, 1919

So much a warrior, relatived to wings
He climbed the blue-shot, blood-swept steeps of war
To battle for the requiem of kings—
So much a Thor!

So much a man, he bore in dignity
His honors; masked their colors rather than
Displayed, and courted anonymity—
So much a man!

So much a friend, so kindly and sincere,
So reverencing truth, so quick to bend
Regard to this of smile, to that of tear—
So much a friend!

So much a Son born in a deathless love,
So much apostle—oh, this earthly one—
God must have felt the need of him above—
So much a Son!

Sgt. Roy Harris Russ.

(David McK. Peterson, a Major in the Air Service and rated a Military Aviator, winner of the Distinguished Service Order, was killed in Daytona on March 16, 1919.)

"Do you hire aeroplanes here, sir?" asked the shy-looking man.

"Certainly. What do you want one for?"

"To look for a servant."

"But wouldn't you be better able to get one at a registry office?"

"No," replied the shy man; "not the one I want. I want to look for our own girl, who tried to light the kitchen fire with kerosene."—*From Aircraft.*

Mother Goose Revised

Little Jack Ladd, sat in a Spad,
To see how the derned thing worked.
He reached out his thumb and pulled back the gun
(10,000 dollars gone home to the folks.)

—

Hey diddle diddle, the prop and the fiddle
The Liberty flew over the moon
The 15 looped to see such sport
And the 23 ran away with the spoon.

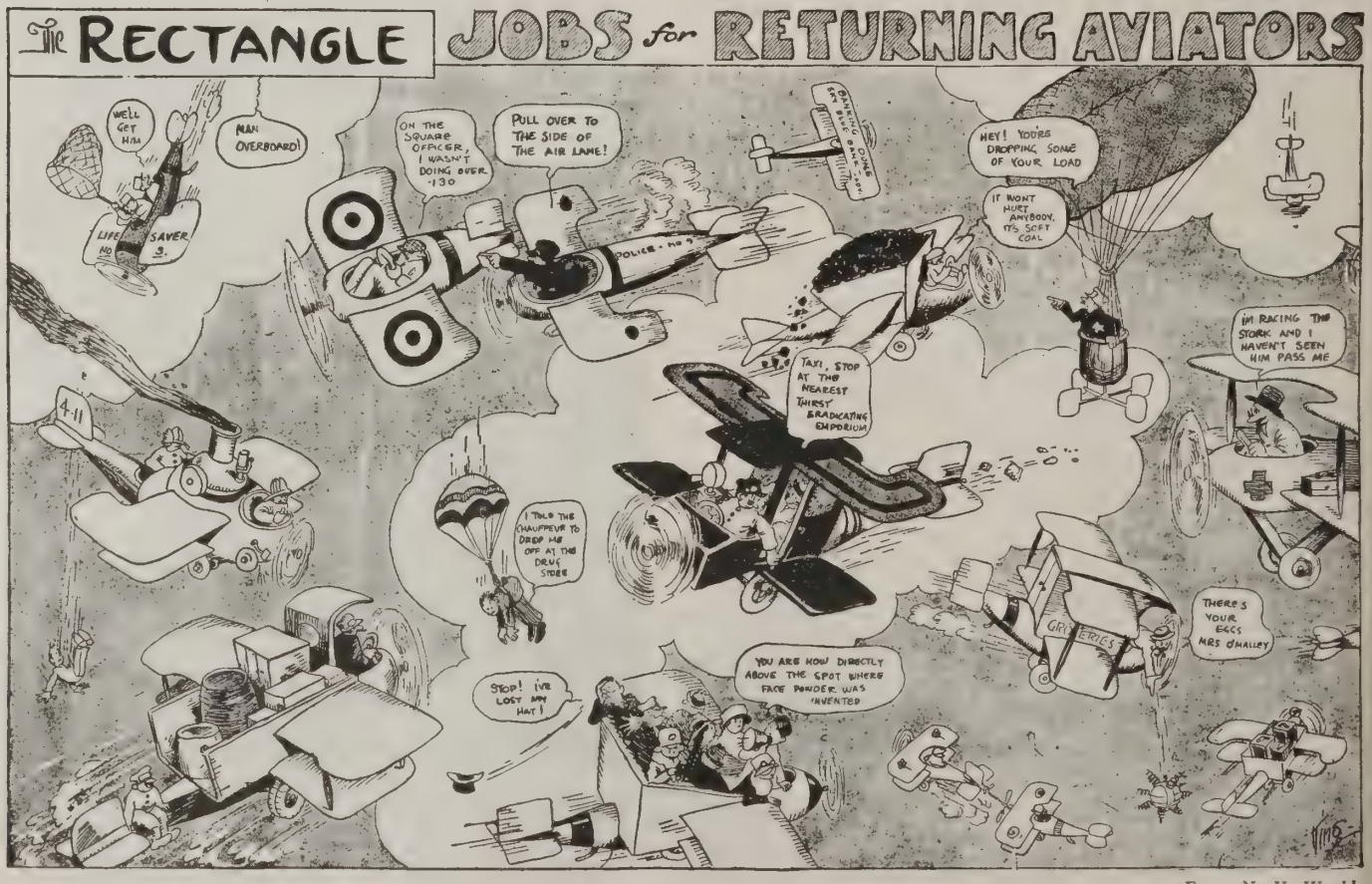
We Agree With You

"I hear you are going to fly the Atlantic, Jones?"

"That's so."

"But don't you think as a Britisher it would be better to start from this side?"

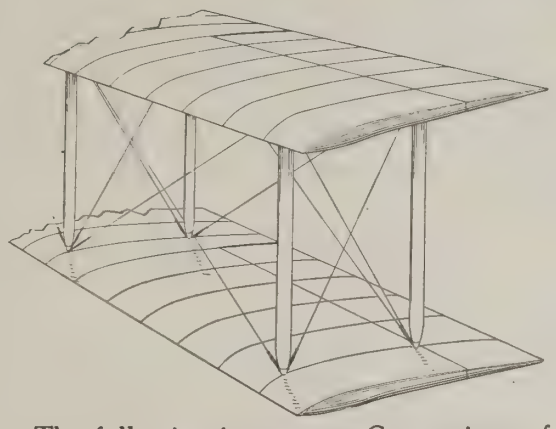
"Not on your life. Since they've adopted prohibition in the States the incentive to get away will be stronger."—*Aircraft.*



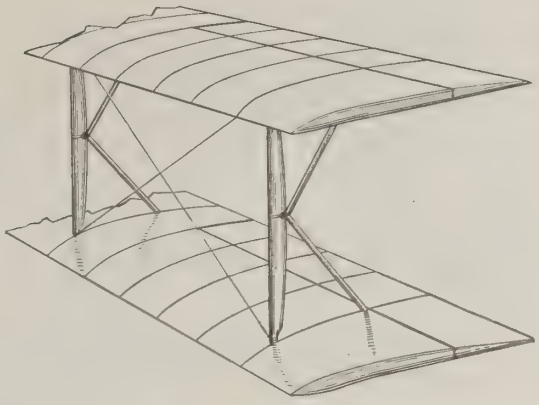
—From N. Y. World.

EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

COMPARISON OF RESISTANCE AND WEIGHT OF K-BAR AND DOUBLE LIFT TRUSS SYSTEMS



The following is an exact Comparison of Resistance and Weight:



The K-bar Truss reduces interference by eliminating interplane struts and wires and also by affording increased Gap cord ratio.

At a speed of 100 M.P.H.,
Wing loading of 9#/sq. ft.,
Safety factor of 8,
Aspect ratio of 6,
Gap/chord ratio of K-Bar Truss...1.143
Gap/chord ratio of Double Lift Truss...1.000

Resistance of K-Bar Truss is $\frac{97.2}{185.0}$ = 52.5% of resistance of Double Lift Truss.

Weight of K-Bar Truss is $\frac{106.45}{146.57}$ = 72.7% weight of Double Lift Truss.

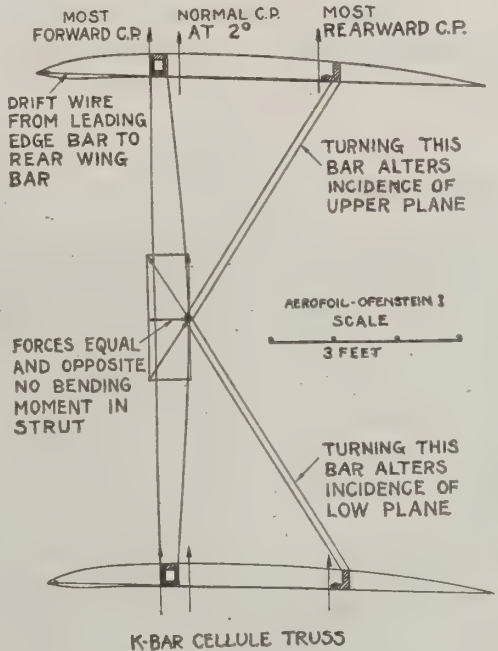
Normal C. P. near central wing bar, only light forces at most rearward C. P.

RESISTANCE AND WEIGHT OF K-BAR TRUSS SYSTEM

Member	Size"	Length"	Area Sq. Ft.	Kx	No.	Rx#	Wt.#
Inner Panel Lift Wire	⅛	141	.49	.0026	2	25.4	19.1
Inner Panel Landing Wire	1/16	141	.306	.0026	2	15.9	9.55
Outer Panel Lift Wire	1/16	154	.334	.0026	2	17.3	10.4
Outer Panel Landing Wire	1/16	154	.2	.0026	2	10.4	3.9
Inner Strut	2.64	96	1.76	.0004	2	14.1	31.0
Outer Strut	1.98	96	1.32	.0004	2	10.5	17.5
Inner Upper K-Bar	⅞	56	.34	.0004	2	2.7	1.7
Inner Lower K-Bar	1½	56	.583	.0004	2	4.7	5.2
Outer Upper K-Bar	⅞	56	.243	.0004	2	1.9	1.7
Outer Lower K-Bar	1⅛	56	.535	.0004	2	4.3	6.4
						97.2	106.45

RESISTANCE AND WEIGHT OF DOUBLE LIFT TRUSS SYSTEM

Member	Size"	Length"	Area Sq. Ft.	Kx	No.	Rx#	Wt.#
Rear Inner Panel Lift Wire	⅛	131	.455	.0026	2	23.6	17.7
Rear Inner Panel Landing Wire	1/16	131	.284		2	14.8	8.8
Rear Outer Panel Lift Wire	1/16	147	.318		2	16.5	9.9
Rear Outer Panel Landing Wire	1/16	147	.191		2	9.9	3.72
Front Inner Panel Lift Wire	1/16	131	.398		2	20.7	13.7
Front Inner Panel Landing Wire	¼	131	.228		2	11.8	6.5
Front Outer Panel Lift Wire	¼	147	.256		2	13.3	7.3
Front Outer Panel Landing Wire	⅛	147	.128		2	6.6	2.4
Inner Panel Inner Wire	¼	95	.166		4	17.3	9.1
Outer Panel Inner Wire	1/16	95	.124		4	12.9	1.8
Rear Inner Strut	2.42	84	1.41	.0004	2	11.3	22.8
Rear Outer Strut	1.74	84	1.01	.0004	2	8.1	11.8
Front Inner Strut	2.29	84	1.33	.0004	2	10.6	20.5
Front Outer Strut	1.64	84	.96	.0004	2	7.6	10.5
						185.0	146.57



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Protected by foreign and domestic patents

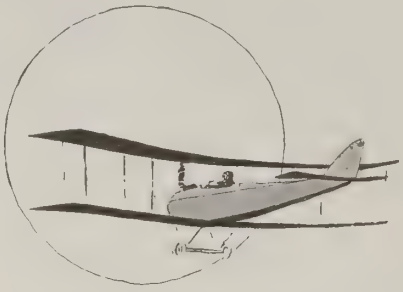
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Dayton, Ohio
Business address: 918 Reibold Bldg., Dayton, Ohio

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(*Continued from page* 529)

meadows between the resort and the mainland towns, and record time for the ten-lap is expected to be established with eight colleges vieing for honors and a share in the cash prizes offered under the terms of the will of Mr. Samuel H. Valentine. This competition does not endanger the amateur status of the competitors.

The new entrants for the event, which is the second of the big series planned by the Pan-American Aeronautic Convention, are Lieut. D. Greeg and Ensign Marion Sulzberger, representing Harvard University; Lieut. G. A. Zabriskie and Ed. Townsend, of Dartmouth College; Ensign Alfred A. Beckwith, of Yale University, and Melvin W. Hodgdon, flying the colors of Tufts College. Lieut. Ferd Eble and Ensign Charles H. Payne will represent University of Pennsylvania; Lieut. G. W. Shaw, U. S. N., New England Conservatory of Music, and Lieut. Jack Frost, Columbia, and Augustus Post, of Amherst College, will make their second attempt for the "expense money."

The many scientific addresses and aerial transportation charts and tables exhibited at the Second Pan-American Aeronautic Convention and Exposition.

Testimonials to Trans-Atlantic Flyers

The news that the NC-4 had arrived safely in the Azores was lustily cheered by the delegates of the twenty-two nations attending the Second Pan-American Aeronautical Convention. The guests arose as a unit in tribute to the daring crew which accomplished the task, and burst out in enthusiastic cheers for Commander Read and his associates.

Colonel William A. Bishop, the Canadian ace who is officially credited with bringing down 72 German planes, was among the guests at the luncheon.

Commenting on the trip of NC-4, President Hawley said:

"The successful flight of the NC-4 to Horta, in the Azores, is indeed a marvelous achievement, and reflects the greatest possible credit upon the United States Navy and the intrepid navigators of the winged ship. It presages successes in the achievement of the dream of man, to bridge the Atlantic. Doubtless the NC-4 at least will finish the journey in one more leap to Lisbon.

"As President of the Aero Club, I extend my heartiest congraduations to the United States Navy and to the American people. It is an event which will live as long as history. It has demonstrated the value of the navy Liberty motor and has vindicated that highly valuable piece of mechanism, despite the early criticisms which were directed against it."

Henry Woodhouse, Vice-President of the Aerial League of America, and author of the textbooks of military and naval aeronautics, said:

"The crew of the transatlantic fliers are the pathfinders of a new age. Inventions, particularly inventions that have increased the speed of transportation and intercommunication, like the steamship, the railroad, the telegraph, and the telephone, have changed world conditions socially and commercially. The advent of the steamship made the Atlantic the central basin of the world, succeeding the Mediterranean. Yet all of these inventions in their early stages hardly held as much promise of usefulness as the aircraft does today."

Captain Robert A. Bartlett, the explorer, a delegate to the convention here, said:

"Now that the flight is an accomplished fact, it can be duplicated in the Arctic. Weather conditions there in June and July are better than these men had, there being daylight for twenty-four hours in the day. To the unbelieving Thomases, this transatlantic feat should convince them that the flying boat has come into its own just as the steamboat did. It is a glorious event, and I trust it will stimulate deeper interest in my polar flying trip."

(*Continued from page* 533)

it has a capacity of 180,000 cubic feet. Cruising speed, 42 M.P.H.; climb, 1,000 feet per minute.

The car is of streamline form, 40 feet long, 5 feet in maximum diameter, with steel tube outriggers carrying an engine at either side. Overall width of outriggers, 15 feet. Complete weight of car, 4,000 pounds.

Seven passengers may be carried, but the usual crew consists of four. At the front, the coxswain is placed; his duty is to steer the machine from right to left. In the next compartment is the pilot, who operates the valves and controls the vertical movement of the ship, and aft of the pilot the mechanicians controlling the engines. At the rear cockpit is the wireless operator.

The engines were made by the Union Gas Engine Company and are 125 H.P. each.

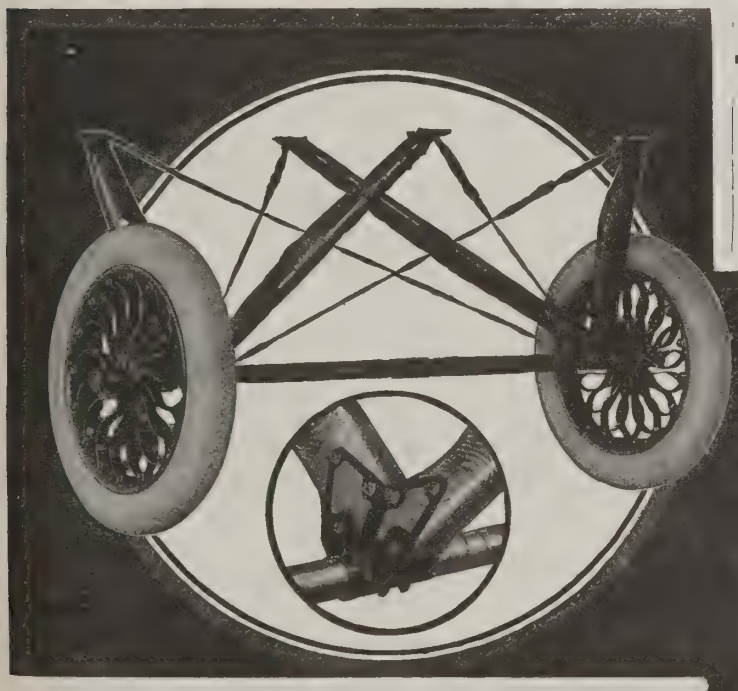


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Gentlemen:

In answer to your telepathically-received (mental) inquiry, "IS FLYING SAFE?" would say that according your inquiry immediate attention affords the writer much pleasure, in that he has been actively and successfully associated with European aeronautical enterprise and progress since 1912, and American since 1911.

During 1913 and 1914 the writer personally supervised passenger flights for virtually all of Shakespeare's "Seven Ages of Man" - and Woman. The latter embraced aerial trippers ranging from prattling baby girls of three years to dear old ladies of 75 and 82 years of age.

In 1914, under the pilotage of one or another of Hendon (London) aviators, the Countess of Rutland, the Countess of Dudley, Lady Victoria Perie, Miss Trehawke-Davis, and over a score of other prominent leaders of British society, paid as high as $2500 for the "privilege" of looping the loop in an airplane. Lord Carberry redeemed his ancestral estates from debt by carrying passengers and giving flying exhibitions throughout Great Britain.

More recently, the heir to the British throne flew over the battle lines in France, and yesterday, LOOPED THE LOOP IN AN AIRPLANE OVER THE HEART OF LONDON. We may assume that flying is fairly safe when the future hope of the British Empire indulges in aerial acrobatics. The Countess of Drogheda is presently giving flying exhibitions in aid of the British Red Cross. Premier Lloyd George frequently flew between London and Paris to attend the Peace Conference, as did Bonar Law, who owns an aero-limousine. King Albert of Belgium asserts it is safer "Up there" than "Down here". Other instances may be quoted.

In March of last year, Senator Harry S. New, Senator Gore, Congressman Schall (the blind Minnesotan representative) and other prominent men, executed every known form of aerial gymnastics over the capitol at Washington. And so on, ad infinitum.

You can now the better appreciate that flying IS safe,- provided, of course, you have a safe machine. Would you like to know why the BELLANCA TWO-SEATER is a SAFE MACHINE? And also why it "fits well around the pocket-book"?

Yours for safe flying,
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(*Continued from page* 547)

and licensing of pilots. The rules should cover also such activties as general interstate flying, coast defense patrol, postal service, forest patrols, commercial photography, aerial transport service, sports and recreations, exploration, night flying, police service, smuggling and incendiarism.

"On account of numerous and urgent requests from various sources throughout the country for assistance in the matter of exhibits and flying exhibitions, it was found necessary to announce some policy in regard to participation by the Government in such activities, and the following policy in regard thereto was announced.

"The Air Service will give favorable consideration to any project of this sort which has for its object aerial performances without remuneration, for development, charitable or co-operative purposes of any international, national, state or civic character, but must adopt as a War Department policy disapproval of any project which involves competition of Air Service teams or individuals with private clubs or enterprises for money or other prizes or trophies" Again, "It is considered an improper use of the time of flyers and of Government property to compete for purses and individual prizes."

In line with the policy previously announced regarding encouragement to private manufacturers, it has been stated on numerous occasions by the present Director of the Air Service that we are desirous of doing everything that is possible and legitimate in the way of encouraging manufacturers who have built up numerous plants during the war to "carry on" in the future. This is a difficult question to deal with. Unless we can give adequate orders for new planes, these manufacturers will have to go out of business as aeroplane manufacturers." Again, "If we do not have adequate appropriation for new orders, no progress in the way of improvement in type is possible. It can readily be seen how closely these two ideas are linked up together and how necessary it is to have a continuing policy, and financial assistance to carry out such policy. It is not desired nor is it considered desirable that the Government itself should undertake the manufacture of planes or engines in quantity. This must be left to private manufacturers.

What it is aimed to do, however, in this line is to establish and maintain an adequate technical engineering establishment where all kinds of experiments may be carried on, where we can even build experimental engines or experimental planes and the facilities of which can be placed at the disposal of investors in carrying on their work. This technical engineering center is now practically an accomplished fact. Then we aim to have a complete engine production plant, to be held as a matter of insurance against future contingencies, such plant not to be used for production by the Government except in time of great emergency, but to be available for such emergency or to be available for use by private manufacturers under contract in case the Government desires to place orders for engines. Such a plant is already available, belongs to the Government, having been paid for during the war. Such a scheme would save to the Government amortization charges in the future on any such contract as that referred to. The cost of maintenance, while idle, of the plant in question would be only nominal, but as a matter of insurance is of far-reaching advantage. It is aimed to do the same thing in regard to a plant for manufactured planes.

The foregoing will indicate in a very general way some of the problems confronting the Air Service and its policy in regard to civilian and commercial activities. I may say incidentally that this Congress is the kind of activity with which we desire to have full and complete "liaison." We are now in close liaison with the Navy Department and the Post Office Department, and it is to one phase of our co-operation with the Post Office Department that I now desire to invite your attention.

One of the aims of the Air Service is to prepare and publish for the benefit of the public at large guide books, road maps etc., similar to publications of that kind for the guidance, etc, of automobilists. Considerable work along this line has already been done, as may be seen by an examination of charts on exhibition at the Air Service Exhibit. The ultimate aim is to have the entire country charted and road maps available for the use of pilots—the whole system to form a complete network linking up all the important centers in the United States. In considering this question the idea at once occurred that there was no better opportunity to make use of the aerial mail service than this, and steps were taken to get in touch with the Post Office Department through the 1st Assistant Postmaster General, Mr. Otto Praeger.

The logical way to extend this network of aerial routes seems to be to municipalities conventiently and properly located to take up the matter and assist in this great work; to designate and set apart adequate landing fields for the use of the Air Service in cross country work, the mail service in handling the mail; and for the use of itinerant pilots. Such a scheme if carried out will serve many

(*Continued on page* 558)





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Landing speed, 35 M. P. H.

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THOMAS-MORSE AIRCRAFT CORPORATION

ITHACA, N.Y. U.S.A.

(*Continued from page* 554)

purposes. It will not only fulfill the purposes just named, but will place the cities concerned "on the map," so to speak, and will pave the way for local benefits resulting from the development of intercity transportation, express service, emergency service, local mapping, police protection, etc. These municipal landing fields will also serve another very important purpose of which I will speak later.

The idea in this matter is to call upon certain municipalities to set aside landing fields under conditions which have been prepared and are now ready for distribution; that when so designated the field will be examined by representatives of the Air Service, the field and vicinity photographed, and then the facilities, which will be necessary at each field, installed. It is not my purpose to go into the details of the matter, these will be left to one of my assistants to present to the Congress at the appropriate time.

On account of the magnitude of this work and the claims that the various cities are likely to put forward as to priority, it has been considered necessary not to include all cities throughout the country at which we ultimately desire to establish landing fields, but to undertake just now only a limited part of the work —to provide a skeleton, so to speak, of the network, then to fill in the details later.

The following list of towns has been selected as the ones where we want to establish these fields in the first instance. It will be recognized that some of these are relatively unimportant in size, and perhaps commercially, but they were selected, more on account of location than commercial importance. The Government also desires to confine itself at present to cities where the aerial mail service requires stations or where they are required for the cross-country use of the Air Service. It is not intended that such limitations should in any way restrict the establishment of other landing fields at cities and towns where conditions warrant such action. These cities are:

Boston, Massachusetts	Flatonia, Texas
New York City, N. Y.	El Paso, Texas
Richmond, Virginia	Texarkana, Texas
Columbus, N. Mex.	Columbus, Ohio
Oklahoma City, Okla.	Tuscon, Arizona
Kissimmee, Florida	Phoenix, Arizona
Uniontown, Penna.	Yuma, Arizona
Raleigh, N. C.	Bakersfield, Cal.
Columbia, S. C.	Fresno, Cal.
Augusta, Georgia.	Buffalo, N. Y.
Macon, Georgia	Syracuse, N. Y.
Atlanta, Georgia	Albany, N. Y.
Mobile, Alabama	Kansas City, Mo.
New Orleans, La.	Daytona, Florida
Baton Rouge, La.	Cleveland, Ohio
Beaumont, Texas	Chicago, Ill.

The important additional purpose which these landing fields will serve, and to which reference was made a little while ago, is this: We desire to keep together as far as possible, at least to keep in touch as far as possible with the officers, trained pilots, mechanics, etc., who have had service during the war. These municipal landing fields it is believed will serve the useful purpose of centering the interest of the classes of men just referred to and the aim of the Air Service is to establish in each one of the communities, where the landing field is maintained, a reserve unit which can then be provided with the facilities for instructions and practice in flying, observing, care and repair of ships, and which would be so organized as to furnish a unit for service in case of emergency. This I consider one of the most important phases of this whole proposition of the municipal flying fields, and the co-operation of every one concerned is earnestly requested.

The Sturtevant Engines

(*Continued from page* 538)

perature around all parts of the cylinders. The water pump has been so designed as to permit easy adjustment of the packing gland.

Thermostat

The Sturtevant Thermostat is arranged to control the temperature of the cooling water. This very important device has been worked out after many months of experimentation by Sturtevant engineers. It is mounted as an integral part of the engine. The Sturtevant Thermostat insures a constant engine temperature regardless of altitude and atmospheric conditions, thereby producing a perfect running engine at all times. "Freezing up," a not uncommon occurrence with aeroplane engines, especially at high altitudes and in long glides, is prevented by the thermostat. The significance of the above will be readily appreciated by those who fly and who know the difficulties encountered. The Sturtevant Company is the first manufacturer of aeroplane engines to work out successfully and adapt a thermostat for water temperature control.

Tachometer

A tachometer which gives accurate readings and which shows no vibration of the needle, is supplied either with or without a positive revolution counter for checking purposes.

Self Starter

The engine has been arranged to permit of the application of an efficient air starter if desired. Any other suitable starter may be applied.

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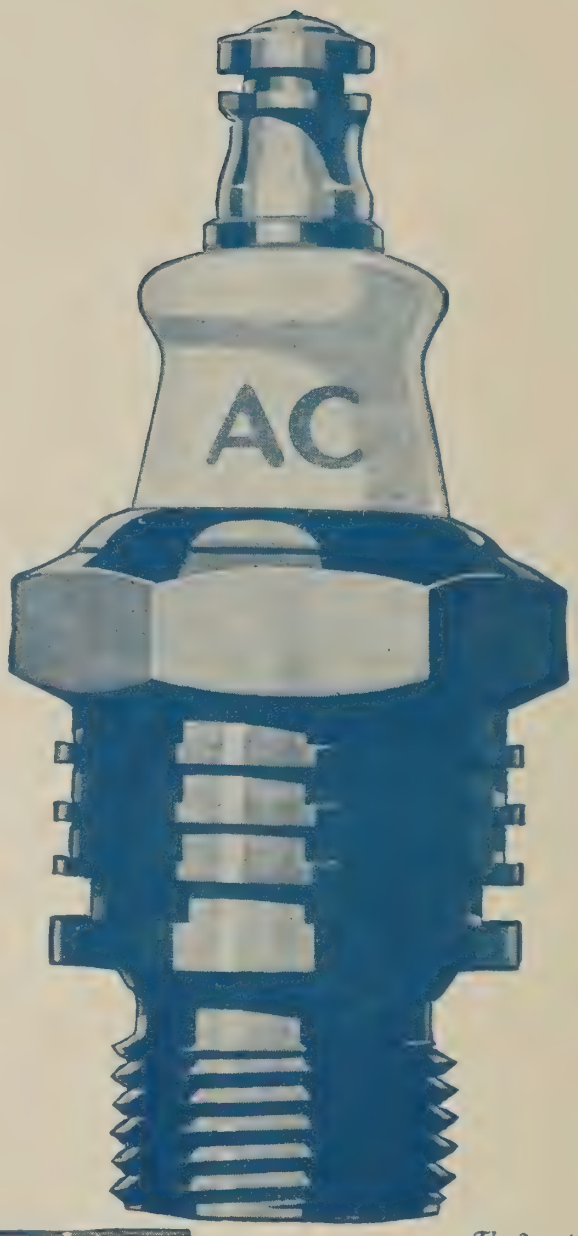


Laugh and the World Laughs With You

Atlantic City Convention Has Aroused Nation-Wide Interest in Aeronautics

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MONTH'S CONVENTION AT ATLANTIC CITY HAS AROUSED NATION-WIDE INTEREST IN AERONAUTICS

THE month's Convention and Exposition, held under the auspices of the Pan-American Aeronautic Federation, Aero Club of America, and Aerial League of America, has aroused nation-wide interest in aeronautics, and has been a very great stimulous in showing to business interests and government departments ways and means of utilizing aircraft effectively in peace time.

Aviation Insurance

CONCLUSIVE indication of the arrival of aeronautics in the commercial stage is given by the recognition that has come from several of the representative insurance companies to-day writing all kinds of insurance on aeroplanes, passengers and pilots, according to speakers talking on the subject of aviation insurance before the sessions of the Second Pan-American Aeronautical Convention.

Lieutenant Charles H. Payne, U. S. N., who has written insurance on all the planes now operating from the local airport and other flying stations here in checking up figures on the record accomplished in the reduction of accidents, declared that from 1908 to 1913, both in military and civil aeronautics, 60 per cent. of the casualties were due to the collapse of the plane, as the result of faulty construction, while from 1913 to date, only 2 per cent. of the casualties were caused by the collapse of the plane.

Of present-day accidents, according to the insurance expert, approximately 40 per cent. are due to tail-spins entered into too close to the ground or by inexperienced pilots who are unable to extricate themselves; 25 per cent. through lack of judgment in landing, 10 per cent. to forced landing caused by motor trouble, 2 per cent. by fire, 2 per cent. by collapse of the planes, and 22 per cent. by lack of judgment in various maneuvers by pilots still in training.

Among the stipulations in the aviation insurance is a clause which declares damage must be in excess of $200 to the plane before the underwriters become liable, this being done because the snapping of a strut or some small part of construction is common. Predictions were made by Lieutenant Payne that inside of six-months aeroplane insurance will be even cheaper than automobile, because of the safety establishment of fields with devices aiding safe landing under adverse conditions, and the mapping out of airways and air routes.



Mrs. May Brown-Dietrich, daughter of ex-Governor Brown, of Maryland, who has been flying at the Atlantic City Airport, with Eddie Stinson. Mrs. Brown-Dietrich, who offered the "Women's Flying Trophy", was the first woman to loop-the-loop six times in succession and to secure an aviation insurance policy

The Second Pan-American Aeronautic Convention
Night Flying Problems

REALIZING that night flying is to play a big part in the impending commercial era of aircraft, the second Pan American Aeronautical Congress turned the searchlight of science on the illumination of air ports. Taking advantage of the convention here of the National Electric Light Association, the aeronautic authorities held a special conference with the electrical wizards, who were headed by A. E. Ryan, the man who made the Pan American Exposition at 'Frisco a "brilliant" success. Major Thomas Baldwin, who is in charge of the port here, led the aero heads.

Co-operative action toward special tests in working out standardization of aviation field illumination were programmed by the conference, the experiments to be made at the great Atlantic City Air Port immediately. What conclusions are reached will serve as the sample for the fields and ports throughout the country.

The problem as it was brought out at the conference, is essentially different from that developed in the marking of fields for war purposes. Under the latter conditions the question was one of concealment by camouflage to prevent discovery of the aviation areas by the enemy while the question now under consideration is one of "antiflage," or making the fields distinctive. Even at the aviation training bases in this country there were no standard plans of marking the land points at night, a simple flare being the only method followed.

The plan under consideration by the conference had to do with the illumination of the terrain to a sufficient degree to bring out all its features—the runways, ground hazards, wires, buildings and the sort, together with the limitations of the field so that the flyers may know just how much elbow room they have.

One of the hardest problems will be that of making the air port illumination contrast with the lighting of cities, especially where the fields are located within a populous centre. The plan suggested to cover this was the tinting of the field illumination and the establishment of aerial "lighthouses" that would flash signals in much the same manner as the coast system works out to water navigators. Each field will have its own code, so that the sky navigator by referring to his chart can discover his position as easily as the skipper of watercraft. It is also proposed a microphone arrangement in the lighthouses so that the "keeper" constantly on duty, may detect the cloud mariner when he comes within a given radius and be able to signal directions by wireless as to where to land and whether or not the park is "clear" for the drop.

One of the novel "range finders" suggested as a double-circle arrangement—one illuminated circle smaller than the other and giving the flyer his range when the little disc shows as the centre of the larger like a bull's-eye. Another plan consisted of sixteen lines converging to a common centre operating automatically from a wind vane, the line lighting up in the direction of the wind and the two lines on either side of this long and the opposite side of the centre also lighting, making an arrow formation.

All the illuminants on the ports will be worked from the indirect system, so that there will be no glare in the eyes of the pilots. The line system of lighting for the wind direction will be from pits so that there will be no obstruction on the surface of the field.

The wires will all be buried, and in lighting any buildings the illumination will be by projected lights from outside points in order to cut down the fire hazards, especially in hangars for dirigibles.

The lighting of the aeroplanes as an additional factor considered as a safety plan. It is proposed to have the planes carry lights port and starboard the same as any other vessel, and tail lights to give other flyers the tip on direction. Powerful projected lights beneath the aeroplane that will enable the pilot to skim over a field and by playing his lights on the terrain below discover just what is there, will be perfected.

Inherent Versus Mechanical Stability

THE aeroplane that will immediately be available for commercial, sporting and every-day purposes will not be the machine that most nearly follows the lines of a bird in construction, but rather the plane that is equipped with automatic devices that constantly check up the stability, meeting bumps, air pockets and other atmospheric disturbances as they start, and adapting the machines to them before they have actually been felt by the pilot.

This was the declaration of Morris M. Titterington, of the Sperry Gyroscope Company, speaking before the second Pan-American Congress. Mr. Titterington told of many startling weapons of the air made possible through the use of automatic stabilizers, which showed the great advantage over machines not so equipped.

"In working out inherent stability," said Mr. Titterington, "attempt is made to make the plane stable by shaping its parts and spacing them in such a manner that it will tend to fly in a horizontal plane and along a straight line.

"Some inherently stable planes fly wonderfully well in still air, banking automatically on turns and maintaining their longitudinal angle in fine style, but they are invariably difficult to control in rough weather, rolling and pitcihng violently on encountering slight disturbances. The rolling, pitching and turning movements are so interconnected that the plane cannot roll without also turning and pitching or turn without rolling. This makes it necessary to work two or more controls when an inherently stable machine encounters a gust, while with the ordinary type the operation of one control would be sufficient. Their rolling and turning movements are particularly strongly connected. In fact, they lose nearly all their inherent stability if held right on the course by the pilot operating the rudder.

"While I do not wish to be quoted as saying that there is no future for inherently stable machines, I believe it to be a fact that the disadvantages inherent in such machines are so great that their field is very limited. As machines are made larger they will naturally be steadier in flight, but no planes have been yet made that will fly successfully in rough air without being controlled by the pilot or by some mechanical stabilizer, and from the very nature of the problem I do not believe such planes can be produced. Man has been making boats from the very dawn of history, but he has not yet made one that would go steadily through a rough sea, notwithstanding the fact that this is a much simpler problem than making an aeroplane fly steadily in disturbed air.

"It is certainly desirable that a plane have a small amount of stability so that it will right itself when upset and tend to remain in the correct flying position, but too great a stable tendency is most decidedly undesirable.

"We now come to the consideration of mechanical stabilizing apparatus, that is, apparatus which might be called automatic pilots, as they control the plane by operating the control surfaces in much the same way that the human pilot would operate them. There have been innumerable inventions and suggestions along this line.

"It is not possible for even the most expert pilot to tell that his plane is encountering a disturbing force until the plane is actually tilted. By this time it has acquired some momentum, and a considerable movement of the controls is necessary to bring it back to its correct position. The advantage of the automatic pilot over manual control is that it detects the slightest tilt of the plane and has already moved the control surfaces to correct it long before a human pilot would notice that the plane was tilting. The result is that the control surfaces are moved only a slight amount as compared to the amount the pilot would move them, and the tilt of the plane is only a fraction of what it would be with manual control.

"There is another use to which an automatically controlled plane can be put that is destined to be of tremendous importance in future warfare, if the new League of Nations does not succeed in preventing wars. I refer to the aerial torpedo, which has been briefly mentioned by the Secretary of War. The idea is to equip a cheaply constructed aeroplane with automatic control, load it with all the explosives it can carry and direct it toward the enemy. Special apparatus is used to dive the machine when it reaches the target. I cannot give much information regarding the progress which has been made with the aerial torpedo, as that would have to come from the Government departments concerned in the work. I think it will be permissible, however, for me to tell of some experiments carried out by the Sperry Gyroscope Company long before our entry into the war.

"A flying boat was equipped with automatic control and other special apparatus. The boat was headed either directly at the target or to one side or the other, depending upon the direction of the wind. The automatic pilot was adjusted so as to climb the machine very slowly. The throttle was then opened and the machine released. It would get off the water automatically and climb to a predetermined altitude, where it was leveled off by an automatic altitude control. It would then fly level until reaching the target, where it would be volplaned automatically by a device which I am not at liberty to describe. In these tests, a pilot went along with the machine to bring it back to the starting point, but, of course, did not touch the control until after the plane had reached its destination. The accuracy of fire was found to be very remarkable, in view of the uncertainty of the air currents.

"There have recently been some published reports of a radio controlled torpedo which was gotten out by the French Government. This torpedo was controlled by radio from another plane several miles away, and in experimental flights was made to fly over different towns behind the enemy's lines.

These torpedo planes were equipped with the Sperry automatic pilot. It is thought if the war had lasted a short while longer the aerial torpedo would have become a very formidable weapon of warfare.

"In peace time there is no doubt that the automatic pilot is destined to be of inestimable value in making flight safe and profitable."

Aerial Laws and Regulations

THE Joint Committee on Aerial Laws and Regulations of Air Traffic of the Second Pan-American Aeronautic Convention presented a report to the convention urging that Congress be asked to create an Aircraft Board in the Department of Commerce to supervise aerial transportation. The report includes the text of proposed temporary regulations to govern aerial navigation regulations that have been indorsed by President Wilson, Secretary of War Baker, Secretary of the Navy Daniels, Secretary of Commerce Redfield and Dr. Charles D. Walcott, the chairman of the National Advisory Committee on Aeronautics.

The text reads:

"An emergency has raised in relation to the establishment of rules and regulations to govern aerial navigation within the United States and its dependencies.

"1—At the present time there is no authority for the establishment of rules and regulations to govern aerial navigation in the United States and its dependencies except local laws passed prior to 1914 in the States of Massachusetts and Connecticut.

"2—The War Department alone now has for sale several thousand aircraft of various types which, if put upon the market, will be purchased largely by amateurs, and in the absence of Government rules and regulations it is highly probable that many accidents will occur and much legislation ensue.

"3—There is also a probability of complications, especially in matters of smuggling, arising by unlicensed, irresponsible aircraft crossing the borders between the United States and both Canada and Mexico.

"4—At the present time the Joint Army and Navy Board of Aeronautical Cognizance has been issuing licenses to pilots as a war emergency, but without assuming any responsibility as to qualifications of pilots or air worthiness of the aeroplanes.

"It is held that the power of this military board ended with signing of the armistice, Federal Judge Walter Evans having handed down a decision on April 3rd to the effect that the war ended legally when President Wilson in his address before Congress on November 11, 1918, referring to the defeat of Germany said: 'The war thus comes to an end.'

"The Aero Club of America has for the past ten years been issuing certificates and contests as provided by the rules of the International Aeronautic Federation which governs all aerial contests."

The Joint Committee urges that Congress be asked to create an Aircraft Board in the Department of Commerce, as provided in the following bill, the adoption of which is urged:

1.—Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That all persons not in the military or naval service of the United States are hereby prohibited from operating any aeroplane, balloon, or other invention or device used for navigating the air, without first obtaining a license from a board appointed by the Secretary of Commerce as hereinafter provided.

Sec. 2. That the Secretary of Commerce is authorized and directed to appoint three persons who shall be known as the Aircraft Board and who shall have power to issue licenses for the operation of machines or other devices which traverse the air for commercial or other purposes.

Sec. 3. That the Aircraft Board shall consist of three men, two of whom shall have had practical experience in the construction and operation of aeroplanes, and one of whom shall have practical knowledge of the construction and operation of a dirigible balloon. The Secretary of Commerce shall designate one of the board as chairman, who shall receive a salary of $4,500 a year; the other members of the board shall receive a salary of $4,000 a year each. The Secretary of Commerce shall provide offices for said board; and such clerical assistance as may be needed shall be employed with the approval of the Secretary of Commerce.

Sec. 4. That it shall be the duty of the board to arrange for and conduct examinations of persons who apply for licenses to operate aircraft machines, balloons, or other similar devices, and a license shall not be issued to any person who, in the opinion of the board, is not qualified to operate the machine or other aircraft device covered by the license for which he has applied. The board may designate persons to conduct examinations at distant points or for the convenience of applicants for licenses. Persons so designated must have qualifications similar to those required of members of the board; compensation for the examiners so designated will be fixed with the approval of the Secretary of Commerce and in no instance shall it exceed $2,500 annually for any examiner.

Sec. 5. That traveling and subsistence expenses shall be allowed on the same basis as that provided in existing law for officials of the Department of Commerce. The sum of $50,000 or as much thereof as may be necessary is hereby appropriated out of the money in the Treasury not otherwise expended to carry out the purposes of this act.

Sec. 6. That the Aircraft Board hereby created is authorized to issue temporary or probationary licenses until such time as a plan for holding examinations is provided and an opportunity given to applicants to try said examinations. When, however, a sufficient time has elapsed and ample opportunity given to hold the said examinations conducted by the Aircraft Board and for any applicant to try such examinations, it shall be unlawful for any person not in the military or naval service of the United States to operate an aeroplane, dirigible balloon, or other device for navigating the air, and any person who operates an air device or invention in violation of the terms of this Act shall be guilty of a misdemeanor and liable to a fine of not to exceed $100 or six months' imprisonment, or both, for the first offense, and imprisonment for not to exceed six months for any subsequent offense.

In anticipation of the adoption of such a measure the Aero Club of America, the Aerial League of America and the Atlantic City Aero Club have established a system of registration of aircraft and aviators at the Atlantic City Airport and are developing a system of registration and clearance papers for aircraft and air pilots and passengers.

The following authorities are members of the Committee in charge of aerial regulations: Messrs. Alan R. Hawley, Henry Woodhouse, Albert T. Bell, W. W. Young, Colonel Jefferson de Mont Thompson, Thomas F. Powers, W. W. Niles, Colonel Charles Elliott Warren, Augustus Post and Major Reed C. Landis, son of Judge Landis and second ranking American Ace.

Aerial Acrobatics

Sensational acrobatics that made even Eddie Stinson, heretofore the most finished of the air pilots who have been amazing the throngs at the Atlantic City Airport, hold his breath from his "orchestra seat" a little off to one side in his own aeroplane, featured when Lt. Omer Locklear, former Army sky-skipper, mounted five times from one aeroplane to another by means of a rope ladder swinging clear in the air. Crowds below, who had been told that the lieutenant, who was the first man to jump from a plane above to the one underneath, would attempt to reverse the order, could see him standing upright on the upper wing and reaching for the ladder as one machine maneuvred by Lt. Melvin Elliott hovered over a second piloted by Lt. Shirley Short.

But it was Eddie Stinson who brought the real story of the maneuvres to the ground. "I have seen some nice balancing aad daring driving of aeroplanes but those two pilots and Lt. Locklear showed me something new today," declared Stinson, who himself was chief of aerial acrobatics in southwestern army flying fields throughout the war.

"While Lt. Locklear was swaying back and forth on top of the Short machine, Lt. Elliott swooped down from above, and so much confidence did those two drivers have in one another that the machines actually kissed one another, making it necessary for Lt. Locklear to drop and stretch out flat on top of the plane. Yet with cool daring he flipped upright again and grabbed for the ladder as they pulled away. It was the most remarkable aerial stunt. It was one of the most daring bits of game flying I have ever seen." Eddie had been up with a photographer, trailing the two planes throughout the trips.

Crowds below knew nothing of the aerial kiss but they saw the machines so close together that they looked as one skooting through the sky over a thousand feet in the air. Lt. Locklear, baffled by the wind, made three desperate trips across the field standing up on the wings of the aeroplane while the throngs below nervously clutched one another fearing that he would be dashed to death at any instant. Just to show that he was still perfectly cool he proceeded to climb all over the plane as it swooped down within a hundred feet of the ground, once hanging by a precarious hold to the skid at the extreme tip of the right wing and again hanging by his knees from the axle of the landing gear beneath the fuselage, permitting the wind to swing him back and forth head down like a pendulum.

The intrepid aviators demonstrated that it would be possible to change to another plane if the one you are travelling on catches fire.

Some of the Exhibitors

Among the exhibitors at the Second Pan-American Aeronautic Convention at Atlantic City who featured display booths in the Aeronautic Hall of the Steel Pier were:

The Curtiss Flying Station, of Atlantic City, represented by Messrs. Harold Kinne, A Livingston Allen and J. M. Reid, which displayed the latest type of Curtiss two-passenger tournig aeroplane, beautifully finished with nickled instruments and fittings and with the fabric removed from one wing and one half the fuselage throughout its length for the instruction of interested visitors; a working model of the largest wind tunnel in the world; drawings, photos and models of different types of Curtiss aeroplanes, seaplanes and flying boats; and the latest Curtiss motors; the Curtiss 6-150 h.p. and the Curtiss 12-400 h.p., until recently known as the K6 and K12 types, respectively. The local Curtiss station wished also to exhibit the Curtiss MF flying boat—3 passengers' capacity and equipped with the Curtiss motor, but the crowded condition of the exhibition hall prevented this. Interested persons were directed to the flying field, where the flying qualities of this "boat" were demonstrated to the interested persons.

The American Propeller and Mfg. Co., of New York City, represented by Messrs. A. B. Streeter and W. W. Christian, which displayed the Inland Piston Rings.

The Brunswick-Balke-Collender Co., of Chicago, represented by Mrs. M. Bull, which displayed different types of the all-rubber propeller which the manufacturers believe will defeat the present effect of rain and sand on the rapidly revolving air screw and which is now undergoing tests for the United States Army and Navy.

The Abercrombie and Fitch Co., of New York, represented by Mr. A. S. McDade, which exhibited an assorted line of aviation clothing and equipment.

Miss Mason's Castle School, of Tarrytown-on-the-Hudson, a school of instruction in aviation for women, represented by Miss Elsie Toboldt.

The Champion Spark Plug Co., of Toledo, O., represented by Mr. George F. French, which displayed the Champion spark plug, the component parts of the plug and a set of colored views illustrating the procedure of manufacture in the company's factories.

The Splitdorf Electrical Co., of Newark, N. J., represented by Mr. Daniel Walls, which exhibited Splitdorf magnetos, instruments and spark plugs and by cleverly arranged devices displayed the manner in which the spark plugs ignite the charge in the cylinder of the gas motor. Two features of the Splitdorf exhibit that were of particular interest to visitors were a Hispano-Suiza motor equipped with Dixie magnetos and Splitdorf spark plugs and a large Victory Loan V that crackled and blazed with the continuous firing of spark plugs embedded in its surface.

The Triplex Safety Glass Co., of New York, displayed Triplex wind shields and aviator's goggles. The Sperry scopic Unit, Mark 1 Mod. E., the Sperry compass, speed indicator, barograph, altimeter, etc. The Aircraft Instruments and Supplies Co., Inc., of Atlantic City, displayed various instruments, including the Shotwell Electric Weather Vane and the Charles Lane Poor Line of Position Computers. These exhibits were in charge of Lieut. Edgar Garland, R.A.F., who also represented the Renault Motor Works, of France, which exhibited the Renault 12 cylinder 350 h.p. motor.

The Aeronautic Library, Inc., of 299 Madison Ave., New York City, represented by Miss Josephine Dunn, displayed aeronautic text books and other books on Aeronautic subjects. The aeronautic publications, *Flying,* AERIAL AGE WEEKLY, and *Air Power,* were represented by a pictorial display.

Other exhibits of great interest were the gallery of French Aerial War Paintings, by Lieut. Henri Farre, official painter for the French army during the war, the aerial war paintings of the American naval aviator, Lieut. Ruttan, and the trophies that were competed for during the convention.

Honor 123 Flyers Killed in Service

Posthumous honors for the 123 officers and enlisted men attached to the marine aviation force and United States naval officers of the Aviation Corps who lost their lives in the service of their country during the war were awarded by the Second Pan-American Aeronautical Congress at impressive services on the Steel Pier.

There were eighteen States represented on the list of the marine force and twenty among the heroes of the naval corps. Diplomas were drawn by the Aerial League of America and forwarded to the mothers or next of kin by the convention through Secretary Post of the Aero Club and the Aerial League of America.

The Memorial Committee consisted of Rear Admiral Robert E. Peary, Alan R. Hawley, Capt. Robt A. Bartlett, Capt. Granville A. Pollock, Rear Admiral Bradley Fiske, Major Reed Landis, Albert T. Bell, Thomas F. Powers, John Hays Hammond, Jr., Col. Lester Jones, U. S. A. M. S., Henry Woodhouse, Joseph A. Steinmetz, K. M. Turner, W. W. Niles, G. Douglas Wardrop and A. S. Abell 3d.

The awards read: "This diploma of honor of the Aerial League of America is awarded ——— in recognition of the patriotic service which he rendered to the cause of humanity and civilization in the service of the United States during the war," and bore the signature of League President Robert E. Peary.

Among the prominent birdmen attached to the Marine Aviation force honored were: Major D. B. Roben, Big Rapids, Mich; Lieut. W. S. Poague, Chicago; Lieut. C. C. Barr, Upper Montclair, N. J.; Lieut. Thomas J. Butler, New Rochelle, N. Y.; Lieut. Edward Cain, Catonsville, Md.; Lieut. Duncan H. Cameron, Englewood Pa.; Lieut. Donald B. Cowles, Carrington, Conn.; Lieut. Marcus A. Jordan, Washington, D. C.; Lieut. Harvey C. Norman, Davenport, Ia.; Lieut. Melville E. Sullivan, Richmond, Va.; Lieut. William R. Julian, Berry, La.; Sergt. Emil Rosenfield, Miami, Fla.; Sergt. William P. Cammon, Cleveland, O.; Sergt. Glenwyn Vorhauer, Sigourney, Iowa; Corp. David F. Price, Boscobel, Wis.; Corp. Wal-

(*Continued on page* 597)



The Curtiss Model H-A Hydro, the Fastest Seaplane in the World



The News of the Week



Stefansson and Wright Discuss North Pole Flight

Dayton, Ohio, May 22.—For the purpose of discussing with Orville Wright the possibility of using the aeroplane for North Pole trips, Vilhjalmur Stefansson, international explorer, paid a visit to Wright at the latter's home here on May 22.

Stefansson declared he believed it possible to construct a special type of aeroplane that would carry a party of explorers to the field of study at the north pole. He plans, if satisfactory arrangements can be made, to attempt such a trip during this year or the first of the coming year.

Col. Hall Given D. S. M.

Washington, D. C.—Award of the Distinguished Service Medal to Elbert J. Hall, formerly a lieutenant colonel in the Signal Corps, for his work in designing the Liberty motor, was announced recently by the War Department.

Two Aerial Forest Patrol Routes Start June 1

Washington, D. C.—Two routes in the patrol of National Forests by Army aeroplanes, to give early warnings of fires in the forests, have been arranged by the War Department and the Forest Service, United States Department of Agriculture. The routes will be operated from Mather Field, near Sacramento, and will be placed in operation June 1, on the same day as two routes to be operated from March Field near Riverside, Cal.

The first route from Mather Field will cover the northern Eldorado and Tahoe Forests on the valley side of the Sierras. It will start from Mather Field and proceed to Placerville, Colfax, Nevada City, Strawberry Valley, and Oroville, where the planes will land at a field now available. This route will be covered in the morning of each day, and return trips will be made in the afternoons.

The second route from Mather Field will cover the southern Eldorado and Stanislaus Forests. Starting from Mather Field the route goes to Placerville, Grizzly Flat, Big Trees, and to a landing near Sonora or Tuelumne. This route will be covered in the morning and return trips will be made in the afternoons. Both of the Mather Field routes have a round-trip length of about 150 miles.

Forest Service reports tell of a successful trial patrol undertaken recently. No difficulty was experienced in detecting fires in heavy timber at elevations of 6,000 to 10,000 feet.

Washington to New York in a Hundred Minutes

Mineola, N. Y.—Captain Leroy Charles and Lieut .John Roullet made a flight on May 17 in a DeHaviland 4 from Washington in an hour and forty minutes.

Victory Loan Fliers Covered 19,000 Miles

The three "companies" of the "Victory Loan Flying Circus" ended 30-day tours at their home stations, after "playing" in 88 cities, in 45 States, and covering in "one-day stands" circuits totaling 19,124 miles.

Navy Plans Larger Aeronautic Program

Washington, D. C.—The Navy Department is so enthusiastic over the results of the first attempt at a transatlantic flight that broad plans are being prepared for expansion of the aerial program. In brief, these points are:

1. General development of aircraft necessary for the fleets, including the enlargement of seaplanes and observation balloons.

2. Extensive experimentation in the laboratory and by flying tests for obtaining improved planes of both heavier than air and lighter than air types, for service in home waters and overseas.

3. Development of the rigid, lighter than air machines (the Zeppelin type), as well as the dirigibles of the C-5 type.

4. Perfection of the coastal aerial patrol service.

A prominent naval official said recently that one of the most important conclusions reached as a result of the flight to the Azores was the practicability of the multi-engine seaplane. The results which had been attained, he said, made it evident that the development of larger and more durable planes which would be almost as seaworthy as a vessel of considerable proportions was feasible and that in the opinion of the navy experts there was no reason why such a seaplane could not be made of sufficient strength to carry at least as many as eight engines.

The advisability of constructing huge lighter than air craft has resulted in recommendation of a large appropriation, said to be $10,000,000, for experimental work on large types of dirigibles.

Curtiss Plane Flies 500 Miles at 2 Miles Per Minute

Portland, Me., May 20.—Major M. H. Gilksen, U. S. A., flying a Curtiss advanced training plane, arrived here on May 20 after a non-stop flight from Mineola, L. I. He made the distance, about 500 miles, in four hours and ten minutes. He was scheduled to stop in Boston, but was going so well that he continued to Portland.

Major Gilksen is accompanied by H. M. McGraw, electrician. Weather conditions were good and the flight was uneventful.

Secretary Crowell Sails on Aeronautic Mission

Assistant Secretary of War Benedict Crowell sailed on May 22 on the transport Mount Vernon with a delegation which will study aviation abroad for three weeks or longer. With the Assistant Secretary were his aid, Colonel James A. Blair, U. S. A.; Captain Henry C. Munson, U. S. N.; Howard E. Coffin, of the counil on National Defense, S. S. Bradley, of the Manufacturers' Aircraft Association, George H. Houston, President of the Wright-Martin Aircraft Company, and Charles M. Keyes, Vice President of the Curtiss Aeroplane and Motor Corporation.

This mission is going abroad for the purpose of learning what Great Britain, France and Italy have done since the armistice was signed to develop a peace-time program for civilian aviation.

On arriving in France they will report to President Wilson and expert advisers will be assigned to the mission. Admiral Knapp, U. S. N., an admiralty expert, and Colonel William Dunwoody, chief of the air service supplies of the American Expeditionary Forces, will be among those called to advise the mission.

New Films of Air in Motion Abuot Aerofoils Will Aid in Design

Washington, D. C., May 22.—A series of films of remarkable value to aircraft engineering were taken under the supervision of Colonel Rutherford B. Harts at Bolling Field under the auspices of the Division of Military Aeronautics and the Inventions Section of the General Staff showing the movement of air in motion. So important is this discovery considered



The Curtiss LR1 triplane with a Curtiss OX engine

that an effort was made to deliver them to Secretary Crowell aboard the transport Mr. Vernon by aeroplane.

Three miles of film were used in making these photographs of air in motion across aerofoils, or wings, of aeroplanes. They prove that the element of rarefaction, which produces the lifting power of an aeroplane, is not continuous, but is exerted in intermittent or pulsating air waves. These power waves have a period of generation, development, climax of lifting power, and speedy collapse, with a resultant aerial undertow. The photographs show plainly that for over 30 per cent. of the time of flight no flying power whatever is exerted on the wings of an aircraft by the air flow produced by the air screws.

The camera is the invention of Fairfax Naulty, of New York.

War Planes Making Fast Cross Country Flights

Washington, D. C.—In connection with the War Department's recruiting campaign, several speedy cross-country flights have been made.

Col. G. C. Brant and Lt. H. Birkett en route Houston, Tex., to New York, flew from Houston to Belleville, Ill., in a De Haviland 4, distance 720 miles, in 453 minutes on 17th.

Lt. Solomon F. Baker flew from Mt. Clemens, Mich., to Jackson, Mich., 94 miles, in 105 minutes.

Using a Curtiss JN4H, Lt. Geo. H. McKay completed a flight from Belleville, Ill., to York, Nebraska, a distance of 500 miles, in 345 minutes.

Bad weather held the flyers at Belleville until May 20, when they flew to Dayton, O., a distance of 310 miles, in 210 minutes. They left Dayton May 22 and flew to Washington, Pa., 240 miles, in 120 minutes. The last leg of the journey was made from Washington, Pa., to Washington, D. C., 235 miles, in 127 minutes.

The 1,505 miles between Houston and Washington have been covered in 910 minutes.

Queens Borough Offers Government Landing Fields

The Queens Borough Chamber of Commerce (New York City) has offered to the Government the services of its manufacturing and industrial committee, Ray Palmer, chairman, in securing necessary landing fields for both aeroplanes and seaplanes. The attention of both the Secretary of War and the Secretary of the Navy has been called to the advantage of Queens for the location of landing fields. There are many large, level undeveloped areas about both Flushing and Jamaica bays. There are facilities—trolleys, railroad and elevated lines—for rapid transit to Manhattan, if for any inexplicable reason an aviator landing in Queens should desire to cross the bridge.

Marconi Wins Exclusive Right to Fleming Valve

A decree signed by Federal Judge Mayer on May 21 gives to the Marconi Wireless Telegraph Company of America the exclusive ownership of a patent granted Nov. 7, 1905, to John Ambrose Fleming. The decree excludes the Atlantic Communication Company from all rights in the invention. The court appointed Ex-Judge E. Henry Lacombe a special master to ascertain the amount of damages to be assessed aginst the defendant company. This device, in improved form, is used for radio telephone communication.

Bureau of Standards Develops Spark Plug Porcelain

Considerable trouble has been caused in aeroplane engine work through the breaking of the central electrode of sparkplugs. An investigation of this problem was undertaken by the Bureau of Standards at the request of the Bureau of Aircraft Production. The results are given in Aeronautic Power Plants Report No. 35, which shows that in many cases the cement used to hold the nickel electrode wire in the porcelain is of such a nature that it rapidly eats away the wire through oxidization, when exposed to the high temperature of the engine cylinder. A cement composed of silicate of soda and raw kaolin has been found to give the least trouble in this respect.

In cases where the cement holds the wire firmly in the porcelain the latter often cracks when subjected to heat due to the difference in the coefficients of thermal expansion of the wire and the porcelain. The breaking of the porcelain does not seem to be due to leaky sparkplugs, as has often been supposed to be the case.

On account of the difficulties attending the use of any form of cement between the porcelain and the central electrode, the elimination of the cement and the use of a mechanical seal at the top of the porcelain is greatly to be desired. In such a plug only a porcelain strong enough to withstand the resulting stresses safely should be used. The porcelain recently developed by the Bureau of Standards is believed to meet these requirements.

Civilian Flying Licenses Issued by the Joint Army and Navy Board of Aeronautic Cognizance

Washington, D. C.—The following civilian licenses have recently been issued:

License No.	Issued to	Address
343	Service Aviation Training & Transportation Company,	Wabash, Ind.
387	Tony Barone,	Fort Worth, Tex.
388	H. W. Hanchette,	Wort Worth, Tex.
389	Clarence F. Cato,	Beaumont, Tex.
463	Francis B. Towle,	Larchmont, N. Y.
464	Donald Gifford Vande Water,	Washington, D. C.
465	Howard J. Ludington,	Holley, N. Y.
466	G. W. Shaw,	Caribou, Me.
467	Laurence L. Russell,	Wilmington, Del.
468	Adolphus R. McConnell,	Knoxville, Tenn.
469	Earl Kenneth Campbell,	Strawberry Pt., Iowa
470	F. E. Carter,	Chevy Chase, Md.
471	Goodyear Tire & Rubber Company,	Akron, Ohio
472	Henry C. Kenly,	Washington, D. C.
473	William L. Kenly,	Washington, D. C.
474	Charters Ward Birch,	Albany, N. Y.
475	Paul B. King,	Salt Lake City, Utah
476	Hannivig Aircraft Company,	New York City
477	Ashmusen Mfg. Company,	Omaha, Neb.
478	E. A. Johnson,	Dayton, Ohio
479	Martin A. Sundeen,	Michigan City, Ind.
480	J. J. Tillis, Jr.,	DeLand, Fla.
481	Charles Fred Taylor,	Waterloo, Iowa
482	R. D. Jennings,	Ravenna, Ohio
483	Logan T. McMenemy,	Rockford, Ill.
484	Carroll G. Taylor,	Dallas, Tex.
485	Edward P. Brennan,	Southampton, N. Y.
486	Thomas Durfee,	Providence, R. I.
487	George L. Barnett,	Des Moines, Iowa
488	Lyman B. Lockwood,	New York City
489	L. Phelps Ashley,	Norwood, N. Y.
490	Mark I. Ashley,	Norwood, N. Y.
491	Edward K. Merritt,	New York City
492	Luke Christoper,	Everman, Tex.
493	Walter B. Hawkins,	511 West Maple St., Monrovia, Cal.
494	George W. Putman,	Box 402, Millensburg, Ohio.
496	George V. Grey,	780 Kinston Ave., Predmont, Cal.
497	Lyman A. Wine,	164 Winona Ave., Detroit, Mich.
498	Clarence W. Osburn,	151 W. Pike St., Clarksburg, W. Va.
499	George C. Beck,	Salt Lake City, Utah.
502	Paul F. Baer,	11 East 38th St., New York City, N. Y.
503	Paul Micelli,	463 West 159th St., New York City, N. Y.
504	Wilber P. Larrabee,	119 Groveland Ave., Minneapolis, Minn.
505	Henry Hugo Hewetson,	493 Ave. E, Bayonne, N. J.
506	Paul Augustine Bogan,	44 Guild St., Boston, Mass.
507	Caspar D. Swinson,	80 Alfred St., Detroit, Mich.
508	Dean L. Lamb,	11 East 38th St., New York City, N. Y.
509	W. M. Brainerd,	533 West 31st St., Oklahoma City, Okla.
510	George Puflea,	2424 Indian Ave., Chicago, Ill.
511	William S. Brock,	care B. W. Beam, Celina, Ohio.
512	N. R. Walling,	1241 Philip St., New Orleans, La.
513	George W. Hill,	1241 Philip St., New Orleans, La.
514	Glen Wm. Poyzer,	703 Merchants Road, Rochester, N. Y.
517	Charles Adam Martin,	326 Barrett Place, San Antonio, Texas.
518	S. C. Wilberg,	595 Charles River Road, Cambridge, Mass.



Curtiss R-4 mail plane equipped with 12 cylinder Liberty motor

Dirigible Lands its Passengers on Cleveland Hotel Roof

Cleveland, May 23.—For the first time on record a vehicle of the air was brought to a convenient stop in the heart of a large city when a dirigible balloon landed on top of a prominent hotel here this evening to permit two of its five passengers to alight. The 160-foot dirigible, the A-4 which has a gas capacity of 95,000 cubic feet, after seven attempts landed on a specially constructed platform 30 by 30 feet.

The balloon was piloted by James Shade from the Wingfoot Lake Naval Air Station near Akron. Ralph H. Upson, winner of the last international balloon race at Paris in 1913, and Major C. H. Maranville, flying instructor at the training station, were among the passengers.

Raw Materials for Aeroplanes

Some idea of the quantity of wood necessary for aeroplane and propeller construction may be obtained from the following table of actual deliveries, as published in a British journal:

	Board feet.	Totals.
Spruce.		
U. S. Army	25,472,000	
U. S. Navy	8,667,000	
England	36,877,000	
France	22,929,000	
Italy	9,147,000	
		103,092,000
Douglas Fir.		
U. S. Army	19,193,000	
U. S. Navy	21,746,000	
England	21,226,000	
France	9,460,000	
		71,625,000
Port Orford Cedar.		
U. S. Army	30,000	
U. S. Navy	1,926,000	
England	2,57,000	
		4,513,000
Mahogany, Central American.		
U. S. Army and Navy	4,524,000	
Allies	4,197,815	
		8,721,815
Mahogany, African.		
U. S. Army and Navy	269,000	
Allies	200,935	
		469,935
American Black Walnut.		
U. S. Army and Navy	2,408,000	
Allies	2,096,000	
		4,504,876
Quartered White Oak.		
U. S. Army and Navy	308,000	308,000
Cherry.		
U. S. Army and Navy	618,000	618,000
Ash.		
U. S. Army and Navy	87,000	
Allies	33,565	
		120,565
Birch.		
U. S. Army and Navy	663,000	663,000

In addition to wood, it was found necessary to maintain strict supervision over the production of aeroplane and balloon fabrics. Of this class of material there had been produced to November 11, 1918, 3,187,000 yd. of linen; 7,000,000 yd. of cotton aeroplane fabric; 2,647,000 yd. of balloon fabric.

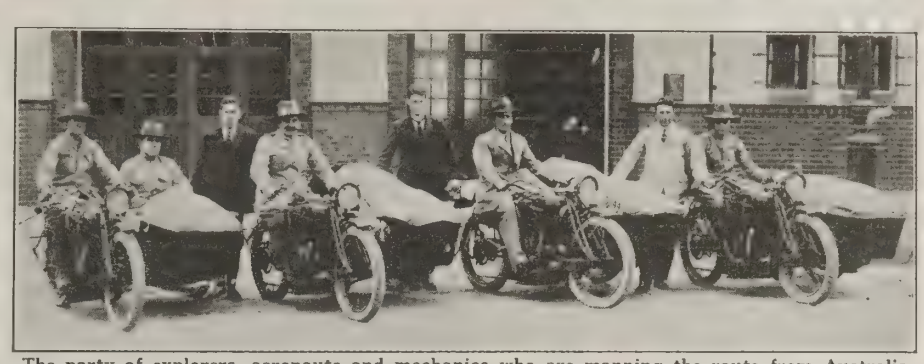
Book Review

How An Aeroplane Is Built: compiled by Stepney Blakeney.

This is a valuable publication for the mechanic. The author—a practical mechanic—knows and explains the best workshop methods and comprehensively describes in this volume every item down to the last rivet.

Contents: Erecting the Fuselage, Wing Structure and Wing Covering, Doping, Aileron Construction, Bolt Making, Lift Plates—The Tail Plane, Checking the Angles of the Wings, Control Levers, Tail-Skid Fittings—Strut-End Fittings, Engine Plates—Petrol Tanks, Completing the Centre Section, Doping, Varnishing and Pigmenting, Erecting the Machines, Odd Jobs and General Examination.

This publication can be purchased at *The Aeronautic Library, Inc., 299 Madison Avenue, New York City.* Price $1.35 post paid.



The party of explorers, aeronauts and mechanics who are mapping the route from Australia to England

ENGLAND TO AUSTRALIA AIR ROUTE BEING SURVEYED

AN aerial mail service between England and Australia is to be established by a new company, known as the "Aerial Services, Ltd.," which has been recently formed in New South Wales. One of the first steps of the company is to make a rough survey of the route to be followed, and this is to be done overland with Indian motorcycles and side cars. The expedition has already set out from Sydney, Australia, and the route to be followed is: Through New South Wales, portions of Queensland, across the Northern Territory, thence to Singapore, via Timor, through Java and Borneo, through the Malay Peninsula, across India and Persia to the Mediterranean Sea and thence to London. Landing places approximately 300 miles apart will be selected.

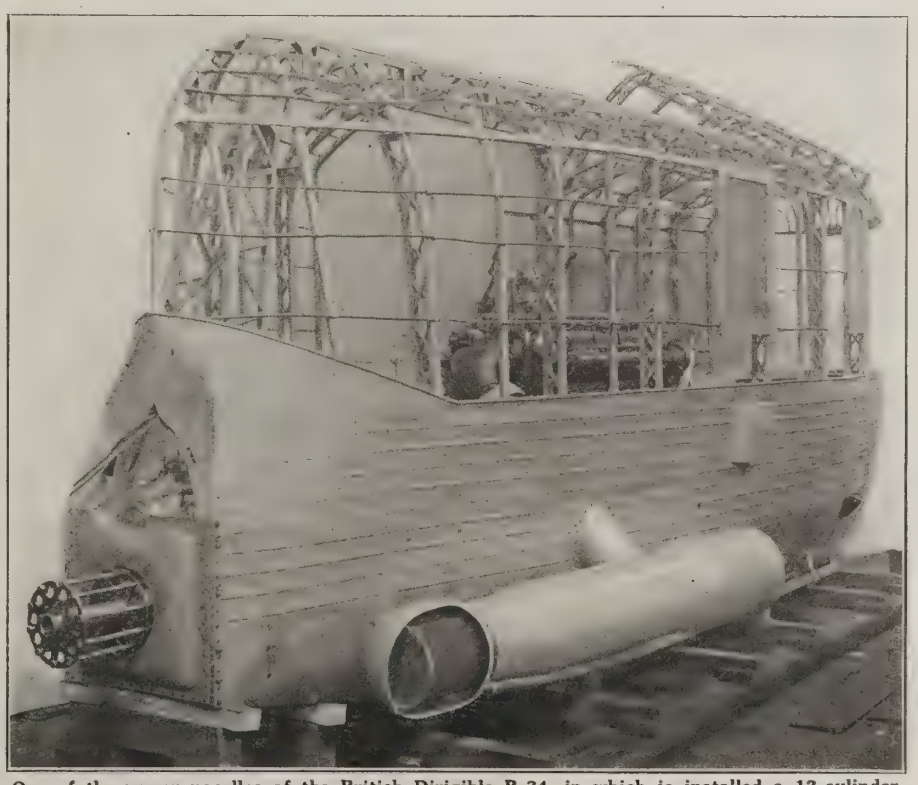
The party consists of Reginald Lloyd, leader; H. B. Manderson, secretary, a well known Melbourne journalist; J. Waldron, surveyor, who has been for seven years doing survey and exploration work for the Commonwealth Government in the Northern Territory, and is also undertaking the photographing and scientific work of the party; J. C. Marduel, a well known French aviator, who has seen active service in Egypt and Gallipoli, both with French and Australian armies, and was also instructor at the Aviation School, Point Cook, Victoria; W. J. Ousley, a motorcycle mechanic, and Kenneth Hunter, the second son of Mr. Percy Hunter, who is general assistant.

The party started on its mapping journey on January 31, making its night stop at Narrabri.

The route proposed to be followed from Narrabri is through Mungundi, Charleville, Longreach, Cloncurry and Bourketown. It is then understood that the party will proceed across the Northern Territory and to Singapore, via Timor, Java and Borneo.

In anticipation of the serious difficulties of travel by land a special outfit of firearms has been selected for each man to forestall trouble with the natives, and all kinds of medicines and emergency surgical apparatus forms part of the equipment. Motion pictures will be taken and many interesting pictures will no doubt be obtained in traversing those parts of the route which have never before been covered by explorers.

As soon as the route is mapped it is intended to cover the journey by aeroplane. Less difficulty is anticipated by this means of travel than by the trail-blazing motorcycle trip now under way.



One of the power nacelles of the British Dirigible R-34, in which is installed a 12-cylinder 275 H.P. "Maroi 4" direct drive Sunbeam Cotalen aircraft engine

THE TRANS-ATLANTIC FLIGHT

EVERY man and woman in the world who knows of Hawker and Grieve's gallant attempt to fly the Atlantic from Newfoundland to Ireland—and to what remote and inaccessible spot has news of their splendid effort not penetrated?—will give thanks that their daring has not cost them life, and will pray that they may be restored to their labors uninjured by their extraordinary adventure.

They had been given up as lost and an amount of money equal to the prize for which they contended had been awarded to their families; even their most hopeful friends had reluctantly abandoned hope for their safety when the news was flashed from midocean that they had been rescued from the sea.

They failed to complete the trip they undertook, it is true, but they displayed the fine sportsmanship that compels the admiration of all.

Harry G. Hawker and Commander Kenneth Mackenzie Grieve, the daring British aviators who flew from Newfoundland one week before were picked up in the middle of the ocean on May 25 after a flight of approximately 920 nautical miles, or 1,058 land miles.

They were rescued 750 nautical miles almost due west from the southwestern tip of Ireland, by the little Danish steamship Mary, bound from Norfolk, Va., to Denmark.

The exact position at which the men were found was announced by the Admiralty as latitude 50 degrees 20 minutes north and longitude 29 degrees 30 minutes west. The distance covered by Hawker and Grieve is roughly speaking 200 miles shorter than the record flight made by the American navy seaplane NC-4, which landed at Horta, Fayal Island, in the Azores, after a jump of 1,120 nautical miles, or 1,288 land miles.

The men were forced to drop into the sea because of the stopapge of the water circulation in the connecting pipe between the radiator and the pump.

Both men are in excellent condition.

The NC-4, the only flying boat of the naval transatlantic fleet remaining in commission, made the flight from Horta to Ponta Delgado on May 20, a distance of one hundred and fifty miles in one hour and forty-four minutes, or a speed of eighty-five miles an hour. Immediately after her arrival, mechanics began overhauling the motors for the next leg of the journey, the eight hundred-mile jump to Lisbon.

An effort was made on the following day, May 21, to resume the flight, but Lieutenant Commander Read reported engine trouble, which made it impossible to take off on that day. May 22 and 23 were extremely unfavorable, a high wind having sprung up.

The NC-3 has been dismantled for shipment to the United States, she having been damaged beyond repair in her long, rough trip after landing on the ocean's surface. Commander Tower's report follows:

"Arrived Ponta Delgada 17:50 G. M. T. (1:50 P. M. Washington time), May 19. Compelled to go above clouds at station eight on account of failure of lights on the pilot's instrument board and necessity of having heavenly bodies for reference. Last destroyer sighted No. 13. Came through the clouds at daybreak, but missed destroyer 14.



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Lieut-Commander Albert C. Read, commanding officer of the NC-4, the only contender remaining of the Naval trans-Atlantic fleet

"Believe thrown off course by high velocity of upper winds, but laid parallel course. Encountered heavy rain squalls 7:45 G. M. T. (3:45 A. M. Washington time), May 17, which continued until 13:30 G. M. T. (9:30 A. M. Washington time), when weather cleared and we decided to land to make observations, as we only had two hours' fuel left. Discovered heavy sea running too late to remain in air.

"Slightly damaged hull and seriously damaged forward engine struts on landing, which made it impossible to leave water.



"The New Arrivals" by Briggs in the New York "Tribune"

"Observations showed this position to be 47.45 north, 30:25 west. [Apparently this should be latitude 37 instead of 47 as given in the despatch.] Gale arose on evening of May 17, which was ridden out successfully until 9:00 G. M. T. (5 A. M. Washington time), May 19, when lost port wing pontoon.

"Seaplane suffered severely but succeeded in riding out gale, and by sailing a total distance of 205 miles made moorings at Ponta Delgada under own power at 17:50 G. M. T. (1:50 Washington time), May 19, having lost starboard pontoon just outside harbor. "Towers."

All hope that Hawker may have been picked up by a ship not carrying wirelessless appears to have been abandoned. Incoming steamers who were in the course of the Sopwith plane report that nothing was heard of the courageous Australian, nor was there any reply to repeated radio calls of Hawker's call letters. No trace whatever has been found of Hawker and Grieve since they disappeared into the sky off Signal Hill.

Undaunted by Hawker's disappearance and the damage in attempting to take off, Captain Frederick P. Raynham is dissembling his Martinsyde machine with a view to repairing it for the long flight. Captain Morgan's injuries are too serious to permit him to attempt the transatlantic flight. Raynham has cabled for another pilot and navigator.

Another contestant announced his entry for the transatlantic flight race in which success is rewarded by the "Daily Mail" prize of $50,000 and failure by almost certain death. The new challenger is Lieutenant Leth Jensen, a French pilot, who came here a few days ago to look over the ground. He has selected Mount Pearl plateau, from which Hawker winged his way, as his starting point. He left for France on May 23 to supervise the completion of his plane. He estimates that it will be two months before he can start. His course will be that of the other pilots entered.

Lord Northcliffe authorized the "Daily Mail" to pay Mrs. Hawker $50,000 for the benefit of herself and baby daughter, and to Commander Grieve's next of kin in the proportion which the airman and his navigator had agreed to share the prize money between them.

A large force of mechanics is working on the assembly of the Handley-Page at Harbor Grace, near St. John's. The Handley-Page biplane has a wingspread of 127 feet, the chord of which is the distance between the upper and lower planes 15 feet 8 inches, and a plane surface of 3,040 feet, with a lifting capacity of 9.08 pounds per square foot. She is fitted with four Rolls Royce Eagle engines, giving a total rated horsepower of 1,500.

In his non-stop flight of 1,361 miles on May 24, from Paris to Morocco, the first stage of the transatlantic flight to Brazil, Lieutenant Roget, the French aviator, broke the world's record of 1,350 miles set by the German aviator Lieutenant Boehm in 1914, who remained aloft 24 hours and 12 minutes.

THE NC-4 FLYING BOAT

THE Navy Department has just permitted to be published a description of the N.C. Flying Boats as they stood ready for trans-Atlantic flight. The issue of the AERIAL AGE for March 24th, 1919, contained outline drawings and a description of the original N.C.1, the first of the fleet.

The original N.C.1 was equipped with three tractor Liberty engines but the experience gained in designing the later machines was responsible for the addition of the fourth engine, a pusher, which put all the machines on equal footing.

The N.C. Type of flying boat represents strictly original American development. The design was initiated in the Fall of 1917 by Rear Admiral D. W. Taylor, chief constructor of the U. S. Navy. The big boats were designed for weight carrying and it was intended to use them in combating the submarine menace which had assumed alarming proportions in 1918. The N.C.1 was completed and given her trials in October, 1918. Since that time the N.C.2, N.C.3, and N.C.4 followed in quick succession.

Commander George Conrad Westervelt, U. S. N., has been in charge of the design and construction of the Naval Trans-Atlantic Flying Boats, as official representative of the Bureau of Construction and Repair.

During 1916 Commander Westervelt was Fleet Naval Constructor of the Atlantic Fleet. In January 1917 he was assigned to duty in Buffalo in charge of naval aircraft construction and inspection, his title later being made Superintendent of Aircraft. His headquarters were moved to New York in July, 1918, from where he supervised the inspection of all naval aircraft produced by Curtiss, Standard, Gallaudet, Aeromarine and Naval Aircraft Factories.

Fully loaded the machine weighs 28,000 lbs. and when empty (but including radiator water and fixed instruments and equipment) 15,874 lbs. The useful load available for crew, supplies and fuel is, therefore, 12,126 lbs. or over 43 per cent. This useful load may be put into fuel, freight, etc., in any proportion desired. For an endurance flight there would be food, water, signal lights, spare parts, and miscellaneous equipment (524 lbs.), oil (750 lbs.), and gasoline (9,650 lbs.). This should suffice for a flight of 1,400 sea miles. The radio outfit is of sufficient power to communicate with ships 200 miles away. The radio telephone would be used to talk to other planes in the formation or within 25 miles.



(Photo by Paul Thompson)
Commander C. G. Westervelt Had Charge of NC Plane Construction

The principal dimensions of all the N.C. Machines are as follows:

General Dimensions

Span, upper plane	126′-0″
Span, lower plane	94′-0″
Chord	12′-0″
Gap, maximum	13′-6″
Gap, minimum	12′-0″
Length overall	68′-3½″
Height overall	24′-5⅛″

Areas

	(*Sq. ft.*)
Main planes (including ailerons)	2,380
Ailerons	265
Stabilizers	268
Rudders	69
Elevators	40
Fins	79

Angles

Wings to hull	3°
Engines to hull	0°
Stabilizer to hull	2°
Dihedral, upper	0°
Dihedral, lower	3°

Weights

	(*Pounds*)
Machine empty	15,874
Fully loaded	28,000
Useful load	12,126
Weight per b.h.p.	17.5

Tank Capacities

	(*Gallons*)
Gravity	91
Fuel	1,800
Oil	160

Performance

	(*Knots*)
Speed range for 28,000 lbs.	74-58
Speed range for 24,000 lbs.	84-55

Main Planes

Considerable research and experiment was necessary to determine the best disposition of material to adopt for wings of this size. The R. A. F. 6 curve is used. The structural weight of the completed wings is only 1½ pounds per square foot, and they can carry a load of 11.7 pounds.

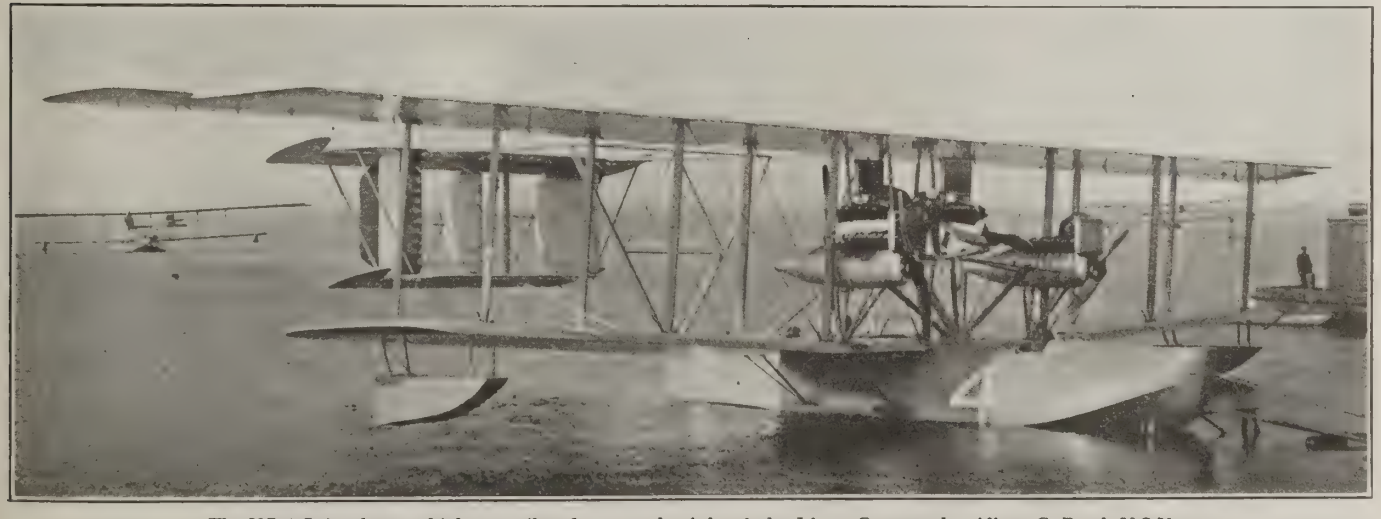
Wing spars are of spruce, box section. Ribs are made up of spruce cap strips tied by a system of vertical and diagonal strips of spruce.

Each rib weighs but 26 ounces. On test they were required to cary a proof sand load of 450 pounds for 24 hours without showing signs of weakness.

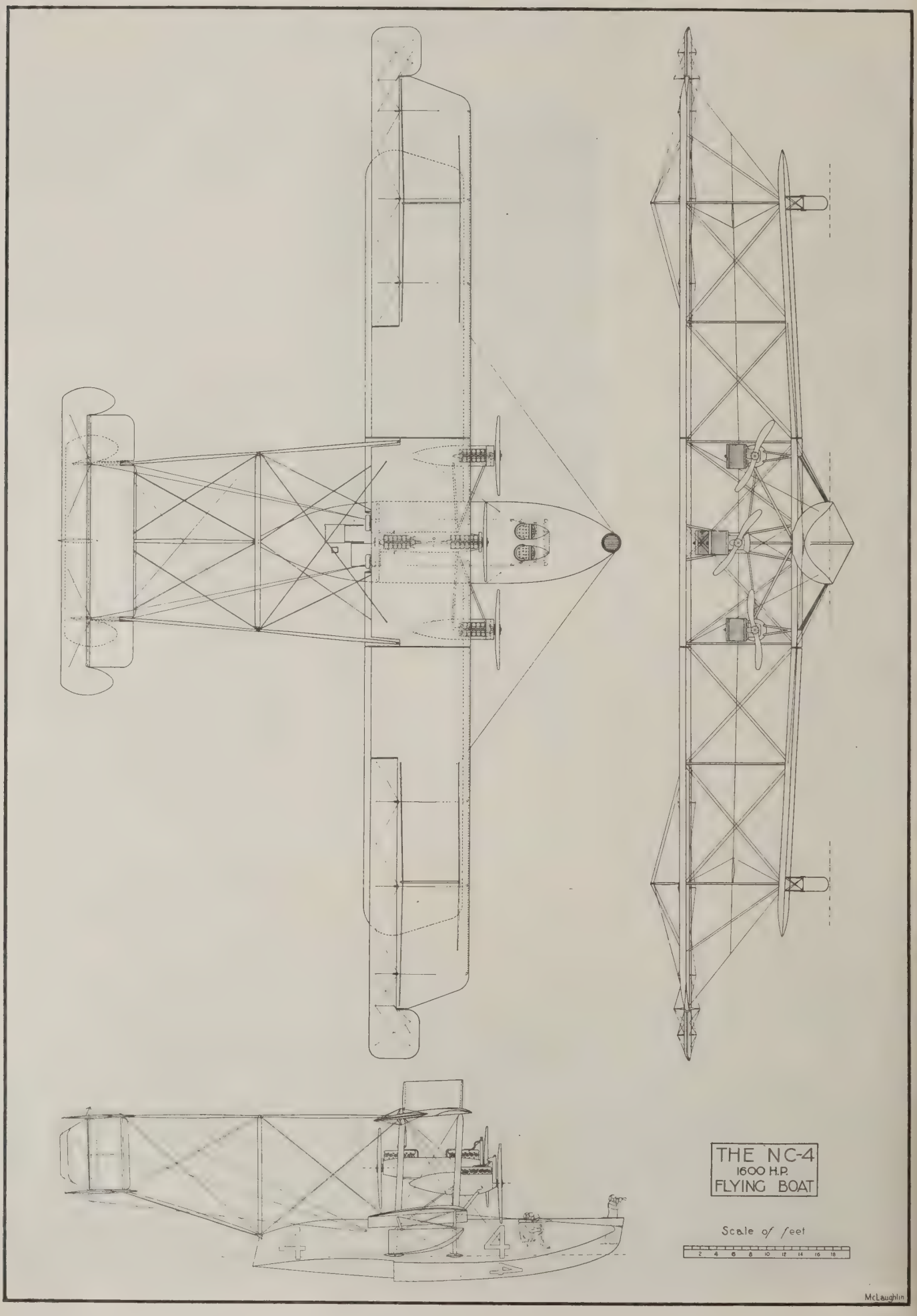
The leading edges of main planes are hinged to permit accessibility to the aileron control cables, which run concealed in the wing.

Interplane struts are of unusual construction. They are of box section spruce, faired off to a streamline shape by stiff fibre. To reduce any tendency of the struts to bow under load, the middle points are connected by steel cable.

The metal fittings where struts and wires are fastened to the wings presented a serious problem. The forces to be taken care of were so large that it was necessary to abandon the usual methods of the aeroplane builder and adopt those of the bridge designer. All forces acting at a joint pass through a common center. In this case, as in a pin bridge, the forces are all applied to a large hollow bolt at the center of the wing beam. In the design of the metal fittings to reduce the



The NC-4 flying boat, which was piloted across the Atlantic by Lieut. Commander Albert C. Read, U.S.N.


THE NC-4
1600 H.P.
FLYING BOAT
Scale of feet
2 4 6 8 10 12 14 16 18
McLaughlin

amount of metal needed, it was decided to employ a special alloy steel of 150,000 lbs. per square inch tensile strength. To increase bearing areas, bolts and pins are made of large diameter but hollow.

The upper plane is in three sections; center section 25' 6½" in span. Lower plane in four sections; inner sections of the lower wing are built into hull. There is a clearance of ¼ inch between outer and inner plane sections.

Outer lower sections have a 3° dihedral; elsewhere plane sections are in flat span.

Ends of struts supporting middle engines are centered 50¾ inches apart. Between these struts the middle engines are located 6'10-3/16" above the center line of the front wing beam. The center line of the top front wing beam is located 6'7-15/16" above center line of nacelle.

The outer engine nacelles are centered 10'6-11/16" from the middle of the machine, and 4'5-1/16" above the top of the front wing beam.

The center engines are located 2'-0" higher than the outer engines.

The span of the upper plane not including the aileron extensions is 114'. Ailerons on the upper plane are 36' long. Cord 43". At the balanced portion the chord is 6'-1". Balanced portion extends 6' beyond the end of upper rear main wing beam. Ends of ailerons project 15' beyond lower plane.

Chord of main planes 12'. Forward main wing beam centered 16½" from leading edge; beams center 84" apart; trailing edge 43½" from center of rear beam.

Hull

The hull or boat proper is 44'-8¾" long by 10 feet beam. The bottom is a double plank Vee with a single step, somewhat similar in form to the standard Navy pontoon for smaller seaplanes. Five bulkheads divide the hull into six watertight compartments, with watertight doors in a wing passage for access. The forward compartment has a cockpit for the lookout and navigator. In the next compartment are seated side by side the principal pilot, or aviator, and his assistant. Next comes a compartment for the members of the crew off watch to rest or sleep. After this are two compartments containing the gasoline tanks (where a mechanician is in attendance) and finally a space for the radio man and his apparatus. The minimum crew consists of five men, but normally a relief crew could be carried in addition.

The hull is designed to have an easy flaring bow so that it can be driven through a seaway to get up the speed necessary to take the air and a strong Vee bottom to cushion the shock of landing on the water.

The combination of great strength to stand rough water with the light weight required was a delicate compromise, and it is believed that a remarkable result has been obtained in this design. The bare hull, as completed by the yacht builder and ready for installation of equipment, weighs only 2,800 lbs., yet the displacement is 28,000 lbs., or one-tenth of a pound of boat per pound of displacement. This lightness of construction was attained by a careful selection and distribution of materials.

The keel is of Sitka spruce, as is the planking. Longitudinal strength is given by two girders of spruce braced with steel wire. To insure water-tightness and yet keep the planking thin, there is a layer of muslin set in marine glue between the two piles of planking.

The Hull is 44'-8¾" in overall length. Step is located 27'-8¾" from the bow. The stern rises in a straight line from the step in a total height of 41½". The hull has a maximum depth of 7'-5⅞", and a maximum width of 10'. The leading edge of upper main plane is located 18'2" from the bow.

Tail Group

The biplane tail is carried on three hollow spruce outriggers. Front beam of upper horizontal stabilizer is 30'-11¼" from trailing edge of main plane. Gap between tail planes, 9'-3". The single lower outrigger from the hull to the lower stabilizer is attached to the stabilizer at a point 10'-11" above the lowest point of the hull.

Span of upper elevator, 37'-11". The lower stabilizer is 32' in span. Ends of upper elevator project 5'-11½" beyond the lower stabilizer. The balanced portion of the elevators is 6'-5" in width.

The upper stabilizer is 31' in span. Lower stabilizer 19' in span. Chord of both stabilizers 5'6".

Vertical fins between stabilizer planes are located at ends of lower stabilizer. From these fins, rudders are hinged, interconnected to balanced rudder situated at the middle of tail plane.

The tail planes have a positive incidence angle of 2°.

Controls

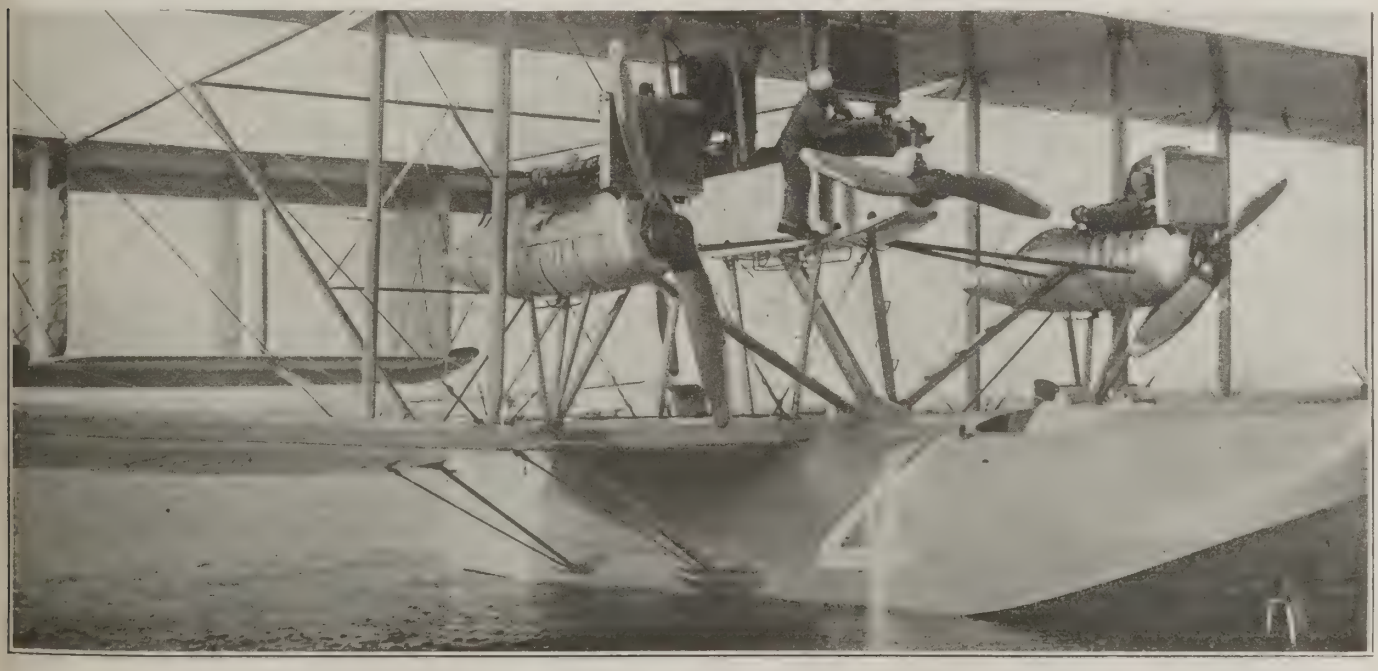
The steering and control in the air are arranged in principle exactly as in a small aeroplane, but it was not an easy problem to arrange that this 14-ton boat could be handled with ease by one man. To obtain easy operation, each control surface was balanced in accordance with experiments made in a wind tunnel on a scale model. The operating cables were run through ball bearing pulleys, and all avoidable friction eliminated. Finally, the entire craft was so balanced that the center of gravity of all weights came at the resultant center of lift of all lifting surfaces and at the tail surfaces so adjusted that the machine would be inherently stable in flight. As a result, the boat will fly herself and will continue on her course without the constant attention of the pilot. When he wishes to change course, however, a slight movement of the controls is sufficient to swing the boat promptly. There is provision, however, for an assistant to the pilot to relieve him in rough air if he becomes fatigued or wishes to leave his post to move about the boat.

Engines

The four Liberty engines which drive the boat are mounted between the wings. At 400 brake horsepower per engine, the maximum power is 1,600 H.P., or with the full load of 28,000 pounds, 17.5 pounds carried per H.P. One engine is mounted with a tractor propeller on each side of the center line, and on the center line the two remaining engines are mounted in tandem, or one behind the other. The front engine has a tractor propeller and the rear engine a pusher propeller. This arrangement of engines is novel and has the advantage of concentrating weights near the center of the boat so that it can be manoeuvred more easily in the air.

A feature that is new in this boat is the use of welded aluminum tanks for gasoline. There are nine 200-gallon tanks made of sheet aluminum with welded seams. Each tank weighs but 70 lbs., or .35 lb. per gallon of contents, about one-half the weight of the usual sheet steel or copper tank.

The face of the radiator for outer engines is 15'-2⅞" from the bow. The face of the radiator for the forward middle engine is 19" back of the face of other radiators. The center line of central nacelle is 6'-5-1/16" above the deck of the hull. Above outer interplane strut the center line of front wing beam is located 13" above the deck of the hull.



A view of the NC-4 flying boat, showing the arrangement of the four 400 h.p. Liberty engines

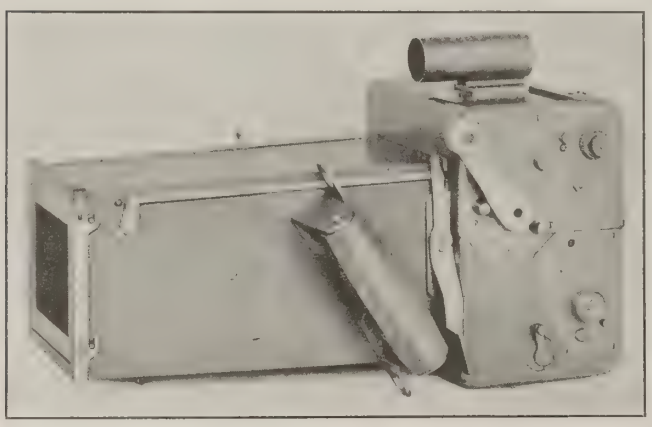
CAMERAS FOR AERIAL PHOTOGRAPHY

By EDGAR H. FELIX, I. R. E.

Formerly Radio Engineer, Signal Corps

NOW that we can turn to the arts of peace those instruments developed for the prosecution of war, it is interesting to inquire into the field of utility of that subject of extensive experiment—the aeroplane camera.

The exacting conditions of military service have resulted in the development of aeroplane cameras of such marvelous sensitiveness, yet of the utmost simplicity of operation, that astounding results were obtained. The public, however, is gen-



The B-1 Camera is very simple and rapid in operation

erally familiar with the service which the aeroplane camera rendered. Photographic maps or "mosaics" have appeared in numerous newspapers and periodicals, and the work of the aerial observer has been frequently described.

The extreme sensitiveness of the aero camera, is not, however, generally appreciated. The largest size of camera in use at the front could make a picture of the ground beneath from an altitude of 15,000 feet, which, when enlarged, revealed the foot-prints of men in the sand. And to obtain this extremely detailed picture from such an altitude an exposure of only one five hundredths of a second was required.

Upon reaching the ground, a staff of trained photographers, equipped with highly developed apparatus, were able to deliver within fifteen minutes, a finished photograph for use of the staff.

It was found for the more accurate work that plates were more suitable than films. Plates are bulkier and heavier, but for chemical reasons, better results are obtainable. For instance, a plate was developed which was capable of photographing the ground below through haze, fog, smoke and light cloud, through which the eye could not penetrate.

The perfection of the pan-chromatic plate and the ray filter has resulted in photographs possessing most remarkable graduation of color value. It is possible, for instance, to distinguish the several species of evergreen trees appearing on a negative taken from an altitude of 15,000 feet.

Automatic cameras, which take a photograph at regular intervals, adjusted according to the speed and altitude of the plane, have made the production of photographic maps a matter of precision and ease. For instance, at the School of Aerial Photography, army students made a map of the city of Rochester, involving the use of six hundred photographs, in a space of two and a half hours.

Photographic map-making readily suggests itself to peace use. However, instead of taking pictures at altitudes of 10,000 and 15,000 feet, owing to anti-aircraft barrage and under constant danger from enemy attack, the peace-time aerial photographer can take his pictures from a low altitude—1,500 feet for instance—and secure as a result a more detailed map.

The aero-map, if I may use that term, must, however, possess advantages over ground photos and maps, to make them a commercial proposition. There are cases where, because of heavy vegetation, marsh, or other difficulties of terrain, that ordinary methods of ground surveying are hazardous and extremely expensive. Herein lies an extensive field of utility for the aerial camera.

As a practical illustration, it has been suggested to one enterprising lumber man whose holdings extend over hundreds of miles of virgin forests, some of which has never been explored, that aeroplane photos be taken at intervals of a mile or two, in order that an accurate estimate of the amount and location of each species of lumber is available on his tracts. Such photos will make possible the filling of the needs of the market in the shortest possible space of time.

In the field of exploration, the advantages and utility of the aeroplane and aero-camera require no exposition. The aeroplane affords a rapid and safe means of transportation, and the aerial camera an accurate and graphic means of recording observations.

Another field of utility will be the photographing of real estate for advertising purposes. A bird's eye view not only permits the presentation of a large tract on one photograph, but forms a most attractive and pleasing advertisement.

Chambers of commerce will undoubtedly utilize the aero-camera for securing photographs of their city, to show the railroad lines, harbor facilities, good arrangement of streets for hauling manufactured products, residential sections for workmen's homes, factory districts, groups of large business buildings and other purposes.

Photographs of the same district taken at intervals of a few years or months can illustrate more eloquently than any array of graphs or statistics the growth of a city or district..

Progress in the construction of engineering projects, such as buildings, bridges, canals and railways, as well as comparative merits of various types of city planning, can be efficiently recorded by the aero-camera.

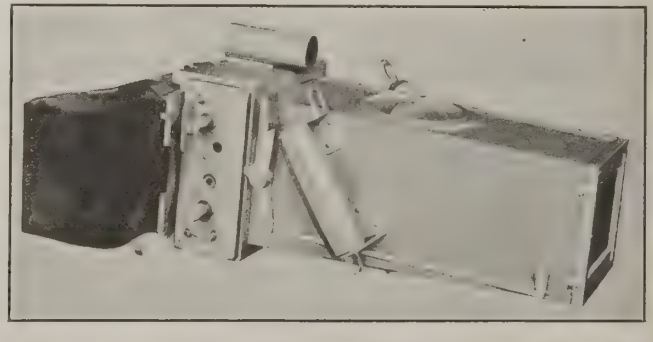
Another field for the aero-photo, which has already had limited use, is in the securing of news pictures. It is only a question of time before the news film companies employ this means of securing photos and films for the screen. The advantages of this method of presentation are obvious. For instance, instead of having a few feet of films taken along the route at the start and finish of the intercollegiate boat races, it is likely that the public will be able this year to see all the exciting moments of the race. The film taken from above will show perfectly the gains and losses of the contenders—even better than the spectator, whose view is limited to one point—will be able to obtain.

The Eastman Kodak Company has produced a large proportion of the aero cameras used in the war by the American forces. Several types are illustrated, and serve to show the high state of development to which they have been brought.

The simplest of these cameras is the type known as A-1. Excellent control over the camera is provided by the two side grips and the position of the thumb lever shutter release. Three movements only are required in making exposures: set the shutter, press the thumb lever release, shift exposed plate.

The body of the camera is made of cast aluminum, and the cone of sheet aluminum. Two lugs for attaching shoulder straps are provided. The shutter permits of adjustment to speeds of 1/120 to 1/435 of a second. A 10" lens having a fixed aperture of f.4.5 is especially designed for this camera. A running thread and set screw permits accurate adjustment at infinity focus.

As a protection against exposure of the lens to fog, mist, or dirt, preventing impairment of the photographic record or against fogging of plate or film, a safety shutter is provided, which is released just before the exposure is made. A direct vision tubular finder, having intersecting vertical and horizontal wires, provides for proper sighting of the camera.

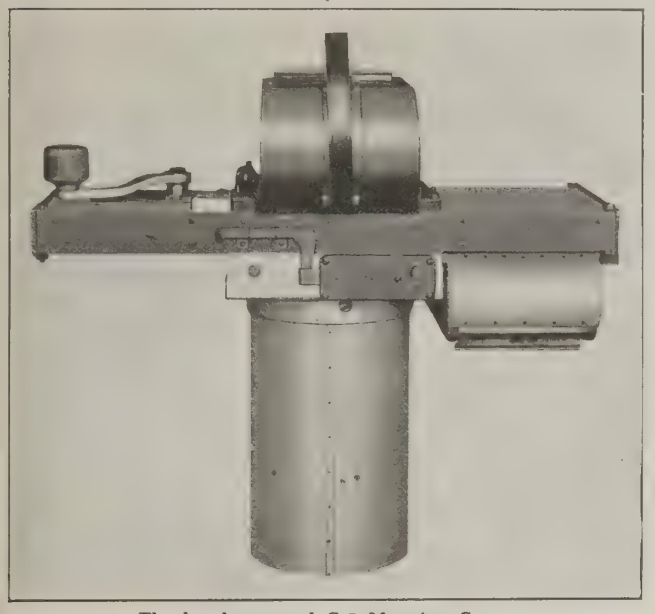


The A-1 Camera is the smallest and lightest type of camera which had extensive use in the war

Either twelve 4 x 5 graflex plates or Eastman cut film may be used on this camera.

The B-1 model is very similar to the A-1. The chief difference in construction lies in the mechanism for rapidly changing the exposed film, resetting the focal plane shutter, and the advantage of daylight loading with cartridge film.

The operation of this model is very simple and exceptionally rapid. The camera is sighted, and a slight pressure upon the



The hand-operated C-2 Mapping Camera

thumb lever release opens the safety shutter, exposing the lens, and makes the exposure. One short, quick turn of a lever advances the film and resets the shutter. This operation can be repeated until 12 exposures have been made. The film is then rewound on the original spool, removed and replaced. The camera weighs ten pounds.

The Model C-2 camera is designed for photographic mapping, to be mounted on a suitable vibration absorbing device, over an aperture in the floor of the plane.

Two metal magazines having phosphor bronze dark slides are provided. These magazines have a capacity for 24 plates in metal septums. The planes in the upper magazine are fed by gravity to the recording plane. The exposure is made by a slight pull of the forefinger upon the shutter release lever. A quick quarter turn of the rotary lever feeds the exposed plate into the lower receiving magazine, closes the recording aperture and resets the focal plane shutter. The rotary feed lever is then returned to its original position, bringing the operator's hand directly over the shutter release lever, ready for the next exposure. The same type of lens and shutter is supplied with this camera as with the A-1, except that its focal length is 8½ inches. The total weight of the camera, loaded with two magazines, is 21 pounds.

A highly perfected automatic mapping camera, known as type K-1, is best suited to extensive mapping operations. It is entirely automatic in its action. The only operation required is starting the camera. One or more exposures, within the limitation of the roll of film, may be made at will by means of a lever controlling the wind motor driving mechanism. The roll film used is 9½ inches wide and 75 feet long, sufficient for 100 exposures. The film is held accurately in the recording plane by constant vacuum suction produced by the Venturi tube, which forms part of the motor mechanism, thereby overcoming all vibration.

The wind motor operating the camera is mounted outside the fuselage, and is connected with the camera by means of a flexible shaft passed through the side of the plane. Control for regulating the time between exposures in correct ratio to the speed and altitude of the plane is conveniently located inside the plane. After each exposure a safety curtain is automatically drawn across the recording plane, thus protecting the film while the shutter is being reset and unexposed film advanced into position.

The shutter permits a variation in exposures from 1/90 to 1/310 of a second. The lens has a focal length of 20 inches and an aperture f.6. The total weight of the camera loaded, with 100 exposure film complete, is 44 pounds.

Although the Eastman Company has not released these cameras for the general public, because they are still on production on Government orders, it is probable that the types described will soon be made available for private use.

Circulation and Piling in the Dry Kiln

A GOOD dry kiln when empty may be a poor dry kiln when loaded with lumber, simply because the wrong method of piling is used. Circulation of air is necessary to distribute the heat and humidity uniformly to all parts of the kiln and to all parts of the lumber pile. In a kiln of good design the circulation is carefully provided for, but obstructions caused by improper piling may defeat the designer's plan.

There are few more effective ways of baffling circulation than by piling into the kiln a quantity of lumber across the path which it was intended the air should follow. If this is done, the circulation becomes sluggish and uneven, permitting the formation of cool pockets in which lumber does not dry and hot pockets in which lumber is ruined.

Air moves differently in different types of kilns, therefore, the proper method of piling the lumber will vary with the kind of kiln used. To run lumber into the dry kiln endwise, or crosswise, or edgewise, without regard to whether the stickers are to be perpendicular or parallel to the direction of circulation is a blind effort and not at all conducive to efficiency or satisfaction.

This point was brought very forcibly to the attention of the Forest Products Laboratory some years ago, when a problem in the operation of a dry kiln of new construction and good design was presented by a large commercial concern. Although the new kiln was far superior to the old one when empty of lumber, in points of design and control apparatus, it dried lumber more slowly and less evenly than the old kiln.

The trouble was that the same system of piling was used in both cases, although the direction of circulation had been changed in the new kiln. The system of circulation in the new kiln was much preferable to that in the old, but the old method of piling, which was intended only for the old kiln, threw the balance the other way.

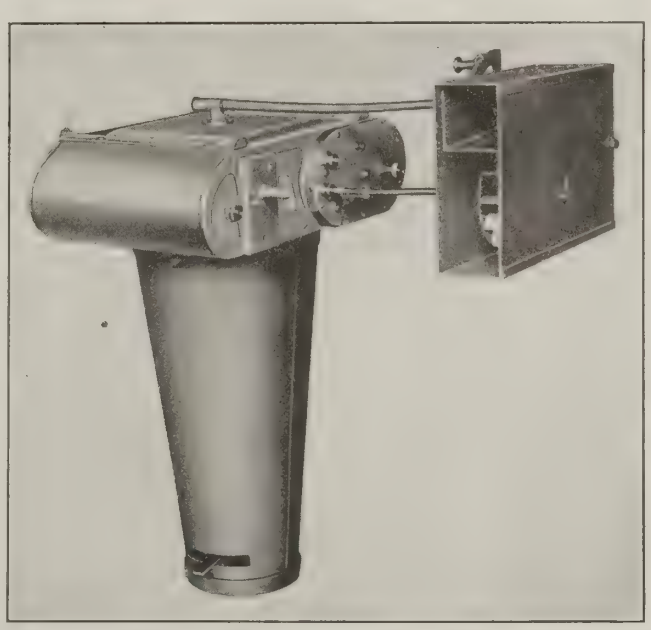
This experience led to careful tests, the results of which have very general and broad application in commercial practice. In a kiln having vertical-lateral circulation, such as is usually characteristic of condenser kilns and of many ventilated compartment kilns, lumber was piled both endwise and crosswise. A curtain was dropped from the ceiling between the two piles in such a way that each pile dried according to the same temperature and humidity. Temperature and humidity readings were taken daily, at different parts of each pile. On the eighth day, for example, the readings were as follows:

Cross piled lumber		*End piled lumber*	
Center of the pile	110° F.	Center of the pile	142° F.
Underneath	168° F.	Underneath	152° F.
Above	146° F.	Above	146° F.

The difference in temperature between the center and bottom of the first pile (cross piled) was 58 degrees, while in the second pile (end piled) the difference was only 10 degrees.

Naturally such differences in temperature at various parts of the piles had a decided effect on the rate and uniformity of drying. The end piled stock dried in 10 days from a moisture content of 30 per cent to a maximum moisture content of 6 per cent. The stock piled crosswise took 13 days to dry from 30 per cent down to 12 per cent.

The lesson is obvious. Lumber should be piled to suit the circulation in the kiln. [Technical Notes of the Forest Products Laboratory, U. S. Forest Service.]



The K-1 Automatic Camera merely requires setting, the mechanism does the rest

THE SUNBEAM AERO ENGINE

IN our last issue we illustrated the "Arab," "Cossack" and "Manitou" Sunbeam aero engines, and this week we take pleasure in presenting some general characteristics of these power plants.

"ARAB" I

8 cylinders.
90° Vee.
Three valves per cylinder.
120 mm. bore.
130 mm. stroke.
12,260 cubic centimetres volume.
Articulating connecting rod system.
Normal revolutions, 2,000 per minute.
Approximate weight per horse-power, 2·5 lb.
Maximum horse-power obtained at 2,000 crankshaft revolutions per minute, 235.
Average petrol consumption, 0·54 pint per horse-power per hour.
Claudel Hobson carburetor, type H.C.7, set in centre of Vee formed by cylinder blocks.
Variable ignition by two 8-cylinder magnetos.
Lubricant consumption, average 6·5 pints per hour of castor oil. Normal oil pressure to main engine details at full power, 45 lb. per square inch.

This engine has also been made with direct drive instead of with reduction gear. A number of these engines have been fitted with hand starters.

"MANITOU"

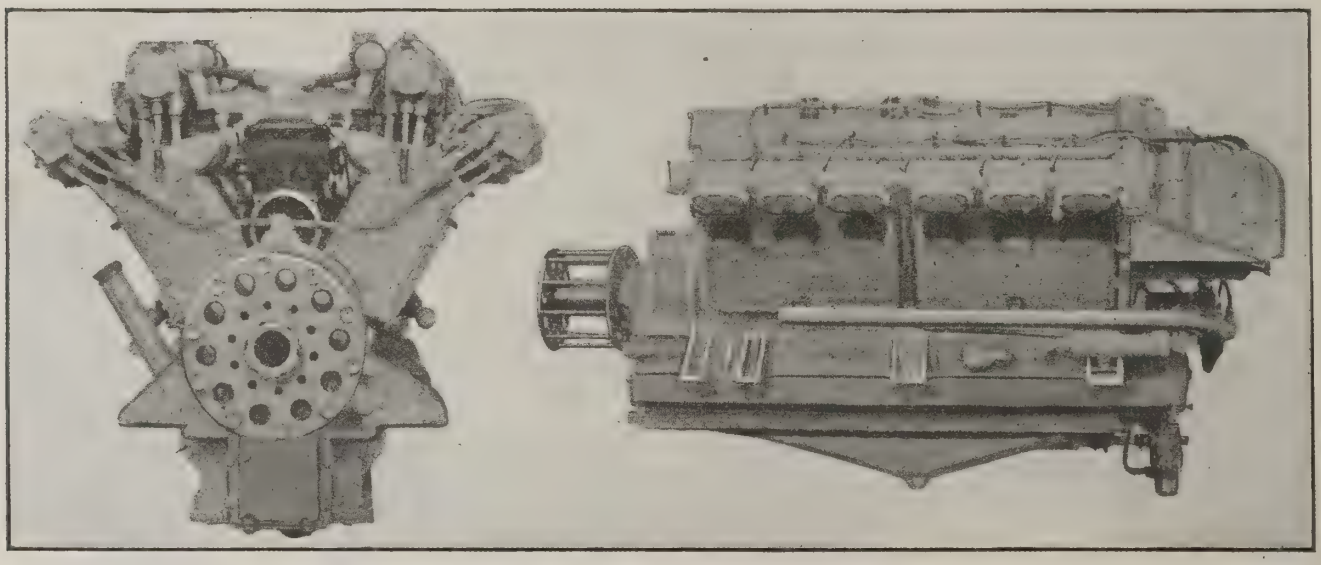
12 cylinders.
60° Vee.
Reduction gear teeth ratio, 28 to 44.
Four valves per cylinder.
110 mm. bore.
135 mm. stroke master road side.
142 mm. stroke link rod side.
15,794 cubic centimetres volume.
Articulating connecting rod system.
314 brake horse-power.
Nominal revolutions, 2,000 per minute.
Approximate weight per horse-power, 2·5 lb.
Average petrol consumption, 0·54 pints per horse-power per hour.
Claudel Hobson carburetor, type H.C.7, set in centre of Vee formed by cylinder blocks.
Variable ignition by two 12-cylinder magnetos.
Lubricant consumption, average 8 pints per hour of castor oil. Normal oil pressure to main engine details at full power, 40 lb. per square inch.

This engine is designed to take an electric starting motor, as well as being fitted with a hand starter.

"MAORI IV"

The "Maori" IV Sunbeam-Coatalen water-cooled aircraft engine has been specially designed for airship work. It has:
12 cylinders.
60° Vee.
Four valves per cylinder.
100 mm. bore.
135 mm. stroke.
12,720 cubic centimetres volume.
Articulating connecting rod system.
275 brake horse-power.
Normal revolutions per minute, 2,000.
Approximate weight, 3·3 per horse-power.
Average petrol consumption, 0·54 pint per horse-power per hour.
Claudel Hobson carburetors, type B.Z.38, set outside.
Variable ignition by two 12-cylinder magnetos.
Lubricant consumption, average 6·5 pints per hour castor oil. Normal oil pressure to main engine details at full power, 45 lb. per square inch.
Fitted with hand starter and electric motor.

The following special fittings are included:—Water-cooled exhaust pipe, automatic governor to prevent over-running, flywheel in place of reduction gear, and extra large water pump to ensure efficient circulation.



Book Review

A TEXT-BOOK OF AERONAUTICS. By Herman Shaw, B.Sc., A.R.C.S., A.F.Ae.S.

A well-arranged text-book on aeronautics, which sets forth in clear and concise language all that the student needs to know in the preliminary stages of his work, and leads him in an interesting manner into more advanced studies, giving him sufficient details to master the difficult problems which present themselves in practice. A thorough study of the book will enable the student to excel in his profession, and will reduce the hazards to a minimum, in the opinion of professional experts.

The author has in this volume recast his lectures to officers of the English R.N.A.S. and R.A.F., given during the period of the war, with additions and many illustrations calculated to add to its value as a text-book of aeronautics. As an instructor of that English air force which reached the highest pitch of excellence during the war, the author has proved the value and efficiency of his methods.

The chapter headings given below will give an outline of the scope of the book. The illustrations are clear and easy of comprehension, and accompany and elucidate the text throughout.

Chapters: I, Some Mechanical Considerations; II, Air Flow; III, Wing Characteristics; IV, Streamline Flow; V, Dynamics of the Aeroplane; VI, Equilibrium of the Aeroplane; VII, Stability; IX, Construction; X, Aero Engines; XI, Air Screws; XII, The Seaplane; XIII, Instruments and Their Use; XIV, Types of Machines; XV, Design of an Aeroplane; XVI, Rigging, Testing and Maintenance of an Aeroplane; XVII, Balloons and Airships; XVIII, Aerial Navigation; XIX, Meteorology; XX, Bomb-Dropping; XXI, Wireless Telegraphy in Aircraft; XXII, Aerial Photography; Index.

This book may be purchased from the Aeronautic Library, 299 Madison Avenue, New York, at a price of $3.75 post paid.

THOMAS-MORSE TYPE S-5 SEAPLANE

THE Navy Department has been using a number of the S-5 Seaplanes for training purposes at the Navy Air Station, Miami, Florida. This plane is really an S-4 C Scout fitted with twin floats. It is the only kind of this type used by the Navy.

The power plant consists of a 100 H.P. Monosoupape Gnome engine.



The Thomas-Morse S-5 Seaplane

General Dimensions

Length	22′ 9″
Spread	26′ 6″
Height	9′ 7″

Weights

	(*pounds*)
Total weight loaded	1500
Loading per sq.ft. of lifting surface	6.25
Weight of machine loaded per h.p.	14.3

Power Plant

Type of engine Gnome (air cooled rotary)	100 H.P.
Engine R.P.M.	1250
Fuel capacity	30 gallons
Fuel duration at full power	3 hours
Oil capacity	6.5 gallons
Oil duration at full power	3½ hours
Propeller type	2 bladed
Propeller diameter	8′ 0″
Propeller R.P.M.	1250

Chassis

Type	Twin pontoons and tail float

Areas

	(*square feet*)
Area lifting surface (including ailerons)	240
Ailerons (two)	30
Elevators	22
Rudder	8.5
Horizontal stabilizer	16.8
Vertical stabilizer	3.5

Performance

High speed	95 M.P.H.
Low speed	50 M.P.H.
Climb in first ten minutes	5200′

THE THOMAS-MORSE S-4 E SINGLE SEATER

THE S-4 E is a modification of the S-4 C Type, brought out to meet the requirements of those desiring a faster machine using the same engine, an 80 H.P. Le Rhone. Besides reducing the wing area, the weight has been reduced by approximately two hundred pounds.

Tapering wings have been fitted with both main wing beams well forward, leaving a slightly flexible feather edge. Remarkable manoeuvering qualities are inherent with this design; the slightest effort is required by the pilot in performing all acrobatics.

General Dimensions

Span	22′ 6″
Length	19′ 4″
Height	7′

Weights

Total weight loaded	1,150 lbs.
Area lifting surface (including ailerons)	145 sq. ft.
Loading per sq. ft. of lifting surface	8 lbs.
Required horse power	90
Weight of machine loaded per horse power	12.8

Power Plant

Type of engine	Le Rhone (air cooled rotary) 80 H. P.
Engine R. P. M.	1,250
Fuel capacity	20 gal.
Fuel duration at full power	2½ hours
Oil capacity	4 gal.
Oil duration at full power	3 hours
Propeller type	2 bladed
Propeller diameter	7′ 6″
Propeller R.P.M.	1,250

Chassis

Type	"vee"
Wheels	2 (tread 5 ft.)
Tires	26″ × 3″

Areas of Control Surfaces (*Square Feet*)

Ailerons	16.4
Elevators	16.8
Rudder	7.3
Horizontal stabilizer	11.2
Vertical stabilizer	3.8

Performance

High speed	112 m.p.h.
Low speed	55 m.p.h.
Climb in first 10 minutes	8,500 ft.

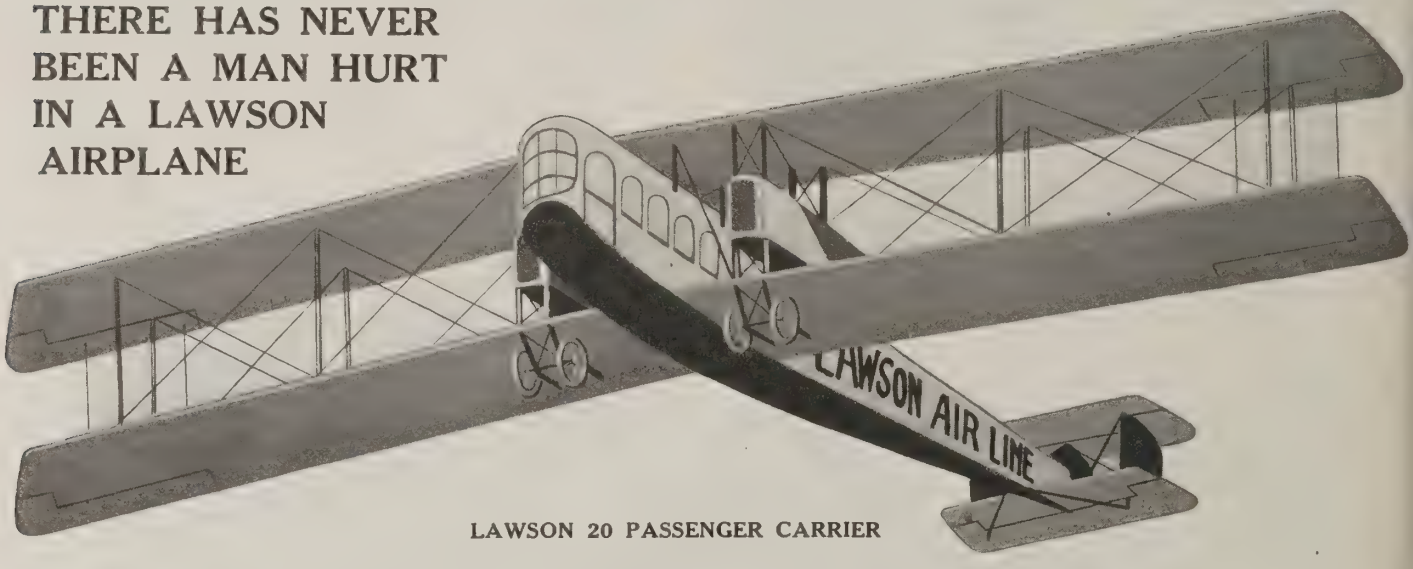


The Thomas-Morse S-4 E Single Seater Advanced Training Scout, which makes a speed of 112 m.p.h. with an 80 H.P. Le Rhone engine

Lawson

Creator of Improved Aircraft

THERE HAS NEVER BEEN A MAN HURT IN A LAWSON AIRPLANE



LAWSON 20 PASSENGER CARRIER

QUICK DELIVERIES CAN BE MADE ON ANY OF THE FOLLOWING NEW TYPES

LAWSON TWO ENGINE 20 PASSENGER CARRIER
LAWSON THREE ENGINE 32 PASSENGER CARRIER
LAWSON TWO ENGINE MAIL CAR—CARRIES 3000 Lb. MAIL
LAWSON THREE ENGINE MAIL CAR—CARRIES 4000 Lb. MAIL
LAWSON STEEL BATTLER—CARRIES 8 MACHINE GUNS

All Lawson aircraft, whether commercial, military or sporting types, are planned, designed and built under the direction of Alfred W. Lawson, the well-known aeronautical expert, who has had 12 years of all round practical experience in aircraft work.

Lawson Air Line Transportation Company

MILWAUKEE, WIS.

BUILDER OF BIG AIRCRAFT

Was First to Advocate Them

ALFRED W. LAWSON, PRESIDENT OF THE LAWSON AIRLINE COMPANY, PLANNED BIG SHIPS OF THE AIR MANY YEARS AGO

NOW that the large aircraft has been so successfully demonstrated it is interesting to note that Alfred W. Lawson, President of the Lawson Air Line Company, was one of the first of the Aircraft manufacturers of the world to advocate their construction and utility.

As far back as 1908, Mr. Lawson as editor of the Magazine "Fly," which he established, frequently called the attention of his readers to the Big Passenger carrying ships of the air that would eventually come, and subsequently, during the years 1910-1911 and 1912, he, as editor of the Magazine "Aircraft," literally filled its pages with his forecasts of big ships in the air.

In 1911 Mr. Lawson as General Manager of the Farman Company of America, endeavored to have that Company build big ships, but at that time capital could not be induced to take such an advanced step.

In 1913 Alfred W. Lawson entered into an agreement with Johann Schuette of the Schuette-Lanz Airship Company of Germany, to establish a passenger carrying air line between New York and Washington. Arrangements were under way for this project when Mr. Schuette notified Mr. Lawson that the Kaiser had forbidden the plans of the Schuette-Lanz Airship going out of Germany.

Mr. Lawson has spent all of his time during the last twelve years in helping to build up the Aircraft industry in America and he has thus gained practical experience from every angle.

The big passenger and mail carrying ships that are now being built under Mr. Lawson's direction in Milwaukee, Wisconsin, are therefore but the outcome of plans he had thought out years ago and which he strived to interest capital to build, then, without success.

During the past three years Mr. Lawson was General Manager of the Lawson Aircraft Corporation, who were principally occupied in building military airplanes. Many new and original types of military machines were designed and built under Mr. Lawson's direction during the war.

The M.T. 1 for primary training; the M.T. 2 for advanced training, the M.T. 3 for Reconnaissance work and an all steel machine—the Lawson Battler—for trench, infantry and cavalry fighting were right up to the minute in their performances. (The Steel Battler was not finished at the time hostilities ceased.)

One thing in particular that Mr. Lawson takes great pride in, and that is that there has never been a man hurt in a Lawson airplane. He is a stickler for safety even at the expense of performance. However, he has up to date invariably gotten the performance as well as the extra safety put into his machines.

More than a year ago, when it was found impossible for steam ships to transport all of the airplanes across the Atlantic that America was preparing to build, Alfred W. Lawson invented the "Trans-Oceanic Float System," whereby a thousand airplanes a day could be sent streaming across the ocean under their own power.

According to this system a number of steamships devoid of their superstructure and known as "Floats" were to be stationed at intervals of fifty miles apart across the Atlantic to act as guide posts and signal and landing stations for all types of airplanes, from whence fuel and aid could be obtained and repairs made when necessary. Land airplanes were to alight upon the decks of these steamships or floats, while flying boats or hydro-airplanes were to alight upon the water alongside of them.

The plans of this system were given to both the United States Navy and Army officials by Mr. Lawson in June, 1918, and shortly afterward the same plans were given to the British Navy.

Mr. Lawson's system made crossing the Atlantic Ocean by airplane a very simple process, a practical everyday feat that could be accomplished by any number of ordinary aviators on any sort of airplanes.

The transatlantic flight by a Navy flying boat recently was made according to the principles of Mr. Lawson's Floating System.

The Navy stationed steamships across the ocean at intervals of fifty miles apart, as indicated in Mr. Lawson's plans, to act as guide posts, signal stations and for fuel and repair ships in case of need.

Events proved conclusively that without these floating stations the Navy flight could not have been made.

The failures of F. P. Raynham and Harry G. Hawker in their attempts to make non-stop flights across the Atlantic prove the futility or at least the uselessness of that system for some time to come.

Recently published photographs show that the British Navy have already successfully tried out and adopted steamship floats for land airplanes to alight upon at sea.

Had the British Navy stretched these steamship floats across the Atlantic at intervals of fifty miles as the United States Navy did with their warships, then Harry Hawker, F. P. Raynham or any other aviator could have flown across the ocean with ease and certainty, and it would not have been necessary to leave their wheels behind or break down from overloading with fuel.

The British Navy would then have proved Mr. Lawson's system for land machines as the United States Navy proved it for flying boats.



THE LAWSON M.T 2, ONE OF THE DIFFERENT TYPES OF MILITARY AIRPLANES DESIGNED AND BUILT BY THE LAWSON AIRCRAFT CORPORATION DURING THE WAR

The AIRCRAFT TRADE REVIEW

Government Orders Loening Monoplanes

The first Government peace time order for aeroplanes has been placed by the U. S. Navy Department with the Loening Aeronautical Engineering Corporation, New York City, for the immediate delivery of six special Loening Monoplanes which are to be used in the Navy Department for shipboard observation use.

Recent experiments started just prior to the close of the war, and continued for several months thereafter, have disclosed the remarkable efficiency with which fast high powered aeroplanes can be used by the Navy Department for observation and spotting of gun fire of the battle-ships. The Loening Monoplane, a new type of two-seater fighter, which was designed by Grover C. Loening, formerly chief aeronautical engineer of the Army Air Service, was accepted by the Government just prior to the armistice, and after official tests was found to be the fastest and best performing two-seater fighter in the world. Several records for speed and altitude have been broken in the official trials by Major R. W. Schroeder of the Army Air Service.

The machines for the U. S. Navy will be so equipped as to permit of launching off the deck of a ship, as it has been found that the light monoplane type of machine can be accelerated very quickly particularly when equipped with a motor as powerful as the 300 Hispano Suiza, which is being used on this type of craft.

Curtiss Company Buys 2,176 Planes and 4,608 Motors

A deal by which the Curtiss Aeroplane and Motor Corporation repurchases from the Government 2,176 aeroplanes and 4,608 motors made by it during the war was announced on May 25 by W. W. Mountain, vice-president and general manager of the company.

This deal had been reported at various times as about to be consummated, but had always fallen through each time before. The contract was signed for the War Department by Major-Gen. Charles T. Menoher, head of the air service, and by G. M. Keyes, a vice-president of the Curtiss concern.

The price was not announced by Mr. Mountain, but it is known that in previous negotiations the Curtiss company refused to buy the planes and motors for $2,720,000 unless the Government agreed not to dispose of other Curtiss planes or motors to private purchasers for two years. It is probable, however, that the price paid is about 10 per cent. of the original figure.

Included in the deal are 1,100 standard aeroplanes which the Curtiss people did not build, but which they are buying in order to get back the Curtiss motors with which they are equipped.

J. A. Callahan Sped Up Curtiss Production 400 Per Cent.

Speeding up an aeroplane production programme from an output of a little more than a hundred to more than four



Mr. J. A. Callahan, manager of motor production at the Churchill plant of the Curtiss Company

hundred a month in a year's time is the record that J. A. Callahan, factory manager of the Curtiss Aeroplane and Motor Corporation, and his organization at Buffalo made during the war period.

During the month of July, 1917, the Curtiss plants, comprising the Churchill Street group, produced 139 aeroplanes for the government.

The output, however, was insufficient and almost daily came requests from the government to "speed up."

On the 31st of July, 1918, Mr. Callahan had increased the production of the plants under his jurisdiction to such an extent that the 400th plane was crated and shipped.

Mr. Callahan was born in Lockport, N. Y., in 1884. After completing his high school education he went to Buffalo, to work with the Thomas Motor Company, where he advanced to manager of stores. Following this he was connected with the T. A. Gillespie Contracting Company, Russell Motor Car Company and Goodrich Tire and Rubber Company.

In 1915, he was made assistant superintendent of the Churchill street plant of the Curtiss company. In a short time, he was made assistant to K. B. MacDonald, then vice-president and general manager of the company. He then took charge of the despatching for all operations and of the keeping of factory records and finally became manager of the Churchill Street group.

Between January 1, 1917, and January 1, 1918, the factories comprising this group made and shipped 1,441 aeroplanes. From January 1 to August 1, 1918, this same group shipped a total of 2,365 machines of the preliminary and advanced training types and specbial models.

After the armistice was signed, the directors of the company decided to concentrate all efforts in combining all of the Churchill Street group—the Bradley, Niagara, South Elmwood and Churchill factories—into one and the Churchill plant was selected.

Mr. Callahan is now in charge of the motor division at the Churchill plant, in addition to the aeroplane division, and the plant is now producing the famous K-6 and K-12 motors in quantity and also the new three-passenger Curtiss Oriole.

Wright-Martin to Get Order for Hispano Motors

New York, May 15.—It is reported, according to *Automotive Industries,* that the Government shortly may place orders with the Wright-Martin Co. for a quantity of Hipsano-Suiza engines. It is stated that the order may amount to $5,000,000.

Aircraft Claims Being Gradually Settled

Washington, D. C.—Slow progress is being made in the settlement of claims against the War Department. All of the big aircraft claims are still out and may not be filed for some time. Approximately 40 per cent of the total of aircraft claims in this district have been approved at Washington. Thirty per cent are now before the board and 30 per cent remain to be filed. Officials of both boards, however, predict that settlement matters will move rapidly from now on. Many points which have been holding back claims have been cleared up at Washington and new regulations are greatly simplifying the work of the board.

National Wire Wheel Works Moves to New Hagerstown Plant

Hagerstown, Md.—The National Wire Wheel Works, Inc., has moved its main office to Hagerstown, Md., where the principal plant of the company is located. The offices heretofore had been located at Geneva, N. Y.

Champion Spark Plug Company Assumes Federal Tax

Toledo, O.—The Champion Spark Plug Company was one of the first manufacturers of automotive equipment to go on record as to how they would handle the new revenue tax of 5% levied on all automobile accessories under the Federal Excise Tax Bill.

On February 27, two days after the bill became effective, the Toledo concern sent a wire to its jobbers throughout the United States advising that the Champion Company would pay the 5% tax and that there would be no change in the price to dealers. The tax is therefore not passed on to the consumer.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative

PILOTS

Dana C. DeHart
Edward V. Gardner
Ira O. Biffle
Leon D. Smith
Gilbert G. Budwig
Trent C. Fry

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

PILOTS

E. Hamilton Lee
Lester F. Bishop
Carroll C. Eversole
John M. Miller
Charles E. Bradley
Max Miller
Frank McCusker

P. O. Dept. Preparing New Newark Landing Field

Washington, May 16.—It is stated at the Post Office Department that the government had decided to go ahead with the preparation of an aviation field on the Heller property in Newark.

A contract has been let for the preparing of a sufficient space in the Heller tract to permit the landing and starting of the aerial postal planes.

Swiss Aerial Mail Service Planned

An aerial postal service is to be organized this summer between St. Gall and Geneva, passing by Zurich, Berne and Lausanne. A tax of 50 c. per letter will be imposed. The service wil only be temporary, experience having shown that good results are obtained even when the distance is over 600 kms.

Air Mail Pilot E. H. Lee Trained Many Stunt Fliers for Air Service

Aerial Mail Pilot E. Hamilton Lee took his first lesson in the handling of aircraft at Fort Snelling Field, Minneapolis, Minn., flying a Curtiss "pusher," and later graduated from the Partridge Tractor School at Cicero Field, Chicago.

When the United States took up arms against Germany, Lee offered his services to the Government and was made flying instructor at Ashburn Field, Chicago, at the time the Fourth Aero Squadron was receiving its training there.

September 13, 1917 he was transferred to Selfridge Field, Mt. Clemens, Mich., as an instructor in stunt flying. On December 15, 1917, Lee made the last official flight of the year at this field, this being the closing day. The weather registered 18 degrees below zero, and the snow was 4 feet deep. A runway was cleared for the landing. The duration of the flight was 11 minutes.

December 23, 1917, Lee arrived at Ellington Field, Houston, Texas, and was an instructor of dual training. February 21, 1918, Ellington Field started a stage of acrobatic flying. Lee was chosen as the first instructor assigned to the stage,

(*Continued on page* 591)



Air Mail Pilot G. G. Budwig, formerly advanced acrobatic instructor in the Air Service, is now testing De Haviland Mail Planes

UNITED STATES POST OFFICE AIR MAIL SERVICE

Monthly Report of Operation and Maintenance

APRIL, 1919

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND UNIT COST					
													Gallons of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
														hr. min.				
2	$38.05	$7.97	$45.98	$46.54	$20.49	$340.03	$68.09	$86.41	$83.29	$67.50	$59.50	$863.85	125	8 43	654	5.23	$99.00	$1.32
3	15.79	1.19	45.98	46.54	20.49	165.03	27.14	83.75	54.33	67.50	59.50	587.24	51	3 28	263	5.16	169.20	2.23
4	87.84	43.49	45.98	46.54	20.49	164.02	106.44	141.35	51.53	67.50	59.50	834.68	291	13 38	957	3.29	61.20	.87
7	54.59	28.89	45.98	46.54	20.49	190.02	66.14	161.30	51.94	67.50	59.50	792.89	180	8 28	706	3.92	93.60	1.12
8	.....	.....	.....	46.53	20.48	78.02	.....	.....	.....	67.50	59.50	272.03	.....	.....	.....	.....	.....	.....
10	157.17	45.65	45.98	46.54	20.49	246.02	235.79	302.96	111.08	46.24	59.50	1,317.42	516	30 13	1 890	3.66	43.80	.70
11	158.06	69.29	45.98	46.54	20.48	245.02	308.33	189.21	63.14	46.24	59.50	1,251.79	1,198	39 31	2,813	2.35	31.80	.45
12	33.96	8.92	45.98	46.54	20.48	140.02	75.11	183.27	103.04	46.24	59.50	763.06	112	9 37	541	4.83	79.20	1.41
14	.....	.....	11.90	46.53	20.48	78.02	.....	22.13	225.00	46.24	59.50	509.80	.....	.....	.....	.....	.....	.....
15	85.15	22.76	45.98	46.54	20.48	196.02	124.64	146.22	92.59	46.24	59.50	886.12	280	15 58	1.218	4.35	54.60	.73
17	16.70	.28	21.50	46.54	20.48	342.02	22.20	155.73	452.73	46.24	59.50	1 183.92	54	2 50	208	3.85	417.60	5.69
30	.....	.....	.....	46.53	20.48	78.02	.....	.....	.....	72.89	59.50	277.42	.....	.....	.....	.....	.....	.....
38	80.36	8.26	34.08	46.54	20.48	153.13	105.92	134.35	52.65	72.89	59.50	768.16	261	13 34	1.110	4.25	56.40	.69
39	24.41	.....	24.48	46.53	20.48	78.02	.....	122.35	.....	72.89	59.50	448.66	80	.....	.....	.....	.....	.....
43	59.09	8.93	45.98	46.54	20.48	140.02	64.32	258.28	48.09	72.89	59.50	824.12	194	8 14	654	3.37	100.20	1.26
24224	12.00	.54	11.90	46.53	20.48	78.02	7.91	.....	.....	50.00	59.50	286.88	40	1 ..	90	2.25	286.80	3.19
39364	89.79	6.13	34.08	46.53	20.48	386.02	44.31	243.10	222.33	72.89	59.50	1,225.16	291	5 40	373	1.28	216.00	3.28
39365	8.99	.....	9.60	46.53	20.48	180.02	2.32	10.40	12.51	72.89	59.50	423.24	29	.. 17	20	.69	1,494.00	21.16
Total....	$921.95	$252.30	$561.36	$837.65	$368.69	$3.277.49	$1,258.66	$2,240.81	$1,624.25	$1,102.28	$1,071.00	$13,516.44	3,702	161 11	11,497	3.11	$84.00	$1.18

Cost per mile, overhead, $.34; cost per mile, flying, $.22; cost per mile, maintenance, $.62.

Note—Complete rebuilding of one plane is included in repairs and accessories.

OTTO PRAEGER, Second Assistant Postmaster General.

NAVAL and MILITARY AERONAUTICS

A. E. F. Trained 2,525 Pilots and Observers

Washington, D. C.—According to a statement recently issued by the statistics branch of the General Staff, to the date of the armistice 2,525 pilots and observers were graduate from the A. E. F. advanced training schools, 77 per cent of whom were sent to the Zone of Advance.

The numbers shown in the following table are cumulative and cover the period from the beginning of the war to November 13, 1918:

Enrolled in training courses....	5,429
Graduated	2,525
Sent to Zone of Advance.....	1,940
Losses in Zone of Advance....	570
Losses in training	450

Arcadia Balloon School Named Ross Field

Washington, D. C.—The Army Balloon School at Arcadia, California, has been officially designated as "Ross Field" in honor of Lieutenant Cleo J. Ross, Air Service, killed in France near Brabrant, September 26, 1918.

Air Service Troops Rapidly Returning

Washington, D. C.—On May 8 there were 19,747 Air Service Troops on duty in the United States, and 28,718 overseas. The net decrease of personnel of air service from November 11 to May 8 is 75 per cent.

The Kelly Field Altitude Record

Lieutenant Fields, Jr., has added 500 feet to the altitude record made by Lieutenant Sweeley, who with Lieutenant Boggs as official observer soared to a height of 20,100 feet. The record will be submitted to the Aero Club of America for homologation under the rules of the International Aeronautic Federation.

War Department Instruction Manuals Available

Washington, D. C.—The War Department News Bureau has a set of instruction manuals issued by the Committee on Education and Special Training, available for examination, covering the following subjects: Auto mechanics and drivers, sheet metal workers, carpenters, telephone electricians, surveyors, machinists and farriers.

Major Mannack Britain's Champion Air Fighter

The Air Ministry has decided that so far as can be ascertained the champion British airman of the war was the late Major Edward Mannock. Lieutenant Colonel William A. Bishop, the Canadian aviator, who won the Victoria Cross, comes next. Major Mannock brought down 73 enemy machines, and Lieutenant Colonel Bishop, 72.

Of all the Allies, Lieutenant Rene Fonck, the French ace, holds the record, with 78.

Major Mannock was born in India of British parents, thirty years ago, and was considered the greatest aerial tactician the Royal Air Force produced. Among his awards was the War Medal of the Aerial Club of America.

All Emergency Men to Be Discharged by Air Service

Washington, D. C.—The War Department authorizes publication of the following information:

The Director of the Air Service is being directed to discharge from the service, with the least practicable delay, all emergency men now being held in the service at camps and stations in the United States for purposes of training except those in the 29th Balloon Company at Ft. Monroe, Virginia. The discharge of emergency men from the latter organization will not be effected for the present except those eligible under the provisions of Circular 77, WD, 1918.

Ruling on Promotions Made

Washington, D. C.—Circular No. 79, W.D. 1919, covering promotions for the period of the emergency within the United States and its possessions, has been revoked. Hereafter promotions will be made to give ranks appropriate to the command in case of line officers or to actual employment in the case of staff officers.

No officer is to be recommended for promotion unless the duty upon which he is engaged is commensurate with the advanced grade recommended and unless there is no officer of appropriate rank reasonably available for assignment to the duty in question. In addition to such vacancies as may be computed by the Chief of the Personnel Branch, of the General Staff, a vacancy may be considered to exist in any grade where the interests of the United States make such promotion necessary. No promotions will be made without personal approval of the Secretary of War.

Overseas Chevrons Computed from Embarkation

The Secretary of War has issued directions that the computation of time for overseas war service chevrons shall include all time from the date of departure from the Port of Embarkation, U. S. A., to date of arrival at Port of Debarkation, U. S. A., both dates inclusive.

Aero Squadrons Designated for Philippine Service

Washington, D. C.—The following observation squadrons are being organized with a view to their later transfer to the Philippine Islands: 2nd Aero Squadron, Rockwell Field, San Diego, Calif.; 3rd, 4th and 5th Aero Squadrons at Hazelhurst Field, Mineola, L. I., N. Y.

All enlisted men assigned to these organizations will have at least two years to serve in their present enlistment period and no man enlsted or drafted for the emergency will be retained in the service to assist in organization of these units or on account of their organization.

Army Seeks Aerial Photographers

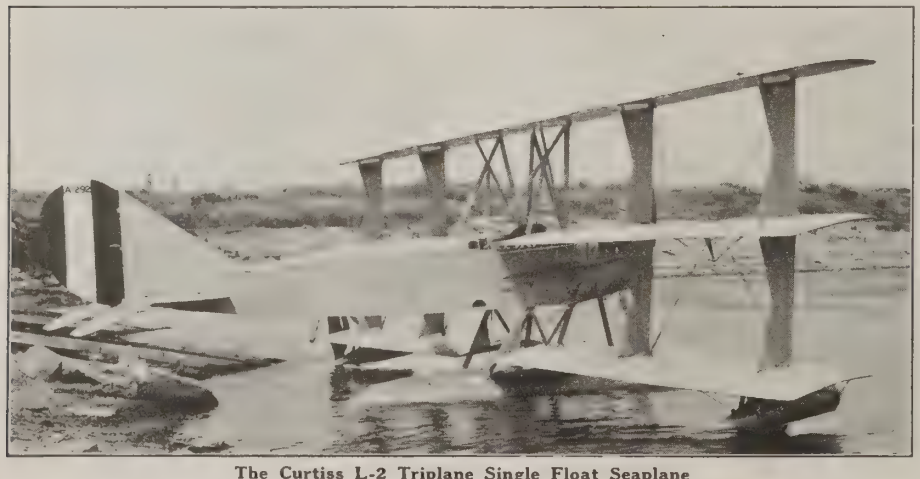
Washington, D. C.—A campaign for the recruiting of aerial photographers has been begun by the War Department. Many inducements are offered to recruits and the chances of advancement in the service are excellent, and flying pay is offered to those whose duties require frequent and regular flights. After one year of service, unmarried soldiers under thirty years of age are eligible to the grade of Provisional Second Lieutenant. Enlistments are for one or three years. Information can be obtained from any recruiting office, or from the Office of the Director of Air Service, U. S. A., Photographic Branch, Washington, D. C.

Colonel Culver Receives D. S. M.

The Distinguished Service Medal has been awarded to the following officers:

Colonel C. C. Culver, U. S. Army, for exceptionally meritorious and conspicuous service. To Colonel Culver's untiring energy, close application and perseverence is due the credit for having completed the coordination of the chain of events leading from the earliest conception of the Radio Telephone to the successful accomplishment of Voice-Commanded Flying carried through to full frutiion.

Mr. Nugent H. Slaughter, formerly Lieutenant Colonel, U. S. Army, for exceptionally meritorious and conspicuous service in the very successful development of the radio equipment of the United States Army.



The Curtiss L-2 Triplane Single Float Seaplane

Mr. Brice P. Disque, formerly Brigadier General, U. S. Army, for exceptionally meritorious and distinguished services rendered in connection with the organization and administration of the Spruce Production activities of the Bureau of Aircraft Production, while serving as officer in charge of the Spruce Production Division and President of the United States Spruce Production Corporation.

Field Officers Who Change Station

The following named field officers have been ordered to change station as follows since May 5, 1919:

Colonel Henry H. Arnold, J.M.A., A.S.A., ordered from Rockwell Field, San Diego, Calif., to San Francisco, Calif., for duty as Department Air Service Officer.

Colonel Joseph C. Morrow, M.A., A.S.A., ordered from Washington, D. C., to Chicago, Ill., for duty as Department Air Service Officer.

Colonel James E. Fechet, J.M.A., A.S.A., ordered from Kelly Field, San Antonio, Texas, to Fort Sam Houston, San Antonio, Texas, for duty as Department Air Service Officer.

Colonel Gerald C. Brant, A.S.A., ordered from Ellington Field, Houston, Texas, to New York City, N. Y., for duty as Department Air Service Officer.

Lieutenant-Colonel Leonard H. Drennan, J.M.A., A.S.A., ordered from Chicago, Ill., to Boston, Mass., for duty as Department Air Service Officer.

Special Orders Nos. 114 to 119, Inclusive

The appointments on April 7, 1919, of the following Air Service officers, for the period of the existing emergency, are confirmed. To be major, Air Service: Capt. John W. Swann.

To be captains, Air Service: First Lieuts.: Fenton J. Baker, Arthur Mason DuBois, Edwin H. Fort, Ballard W. George, Edward Glik, Isaac Morley Griswold, Cecil Hewitt, Thomas H. Hiltz, Bruce C. Hopper, Frank H. Johnson, Thomas D. Jordan, Morse B. Kent, Geoffrey C. Maxwell, Howard J. Meyer, Lewis Joseph Newman, Walter Jay Reed, James Wade Rockwell, Raymond C. Sanborn, Stanley P. Smith, Patrick H. Whittington, Samuel J. A. Wifvat, William A. Williams, Edgar Youngdahl.

To be first lieutenants, Air Service: Second Lieuts. Carl R. Bass, Frederick W. Borchers, Fred W. Clark, Murry H. Eckman, Henry U. Farnsworth, Charles S. Gilbert, Robert Corbould Green, James F. Haldeman, Frank Duncan Kelley, Samuel Roger Klubock, Charles Howard La France, Joseph A. Lowery, John F. Malone, Stanley Nowlen, Frank Herbert Prem, Merwyn Colvin Randall, William N. Reagan, William H. Reese, Henry D. Roberts, John Howard Robinson, Richard H. Scott, Jr., Robert Steinberger, Clarke S. Sutherland, George Lear Tomlinson, Paschal Williams, Roy D. Witmer.

The appointments on April 9, 1919, of the following-named officers, Air Service, for the period of the existing emergency, are confirmed: To be captains, Air Service: First Lieuts. Russell V. McMurphy, John Robert Harman, James W. Stokes.

The appointments of the following-named Air Service officers, for the period of the existing emergency, are confirmed: To be major, Air Service: Capt. Henry John Whitehouse. To be captain, Air Service: First Lieut. Bertram Winthrop.

To be major, Air Service: Capt. Alvin C. Reis. To be captains: First Lieuts. Dogan Humphries Arthur, William Henry Carthy, Harvey Weir Cook, Russell Stewart Dean, Howard T. Douglas, Clifford E. Gregory, Edward Grotecloss, Jr., Horace Moss Guilbert, Edmund A. Hastings, Phil A. Henderson, Charles C. Hicks, Samuel Kaye, Jr., George Churchill Kenney, John H. Lambert, Richard C. M. Page, Robert C. Paradise, Roy S. Ripley, William C. Thomas.

To be first lieutenants, Air Service: Second Lieuts. Emil L. Balfay, Joseph Francis Becker, Edward Crews Black, George Raymond Cullman, Roy U. Dabbs, James L. Davitt, Edward Keenan Delana, Oswald A. Eckhardt, Sidney Bradford Grant, Charles P. Harrington, John W. Jordan, Otto D. Trunk, Robert Wilson Watt, Clement Edwin Kennedy, William Henry Leininger, Paul Jones Mathis, John Michael McDonnell, Charles W. Richard, Verner Delane Sapp, Howard Smith, Bruce Struthers, Eugene E. Stuck, Alexander Tolchan, Curtis Wheeler.

Maj. Carl Spatz will proceed from Rockwell Field, San Diego, Cal., then to Taliaferro Field, Hicks, Tex., take station there, assume command. Report by letter to the Director of Air Service, Washington, D. C.

First Lieut. John W. Dissette, Air Service (Aeronautics), promoted to captain Air Service (Aeronautics).

Second Lieut. Isaac B. Van Devanter, Air Service (Aeronautics), promoted to first lieutenant, Air Service (Aeronautics).

Capt. Lee W. Felt, Air Service (Aeronautics), now at Post Field, Fort Sill, Okla., will proceed to Washington, D. C., on temporary duty not to exceed five days; thence to San Francisco, Cal., and report in person to the general superintendent Army Transport Service, Fort Mason, for transportation to Honolulu, Territory of Hawaii, on transport leaving San Francisco about June 5, 1919, reporting upon arrival to the commanding general Hawaiian department for duty.

First Lieut. Alfred W. Marriner, Air Service (Production), will proceed to Washington, D. C., for temporary duty; thence to San Francisco, Cal., and report to the general superintendent Army Transport Service, Fort Mason, San Francisco, Cal., for transportation to Honolulu, Hawaii, reporting upon arrival to the commanding general Hawaiian Department.

First Lieut. Frank B. Tidwell is announced as on duty requiring him to participate regularly and frequently in aerial flights from November 5, 1917.

First Lieut. George D. Litherland will proceed to San Francisco, Cal., and report to the general superintendent Army Transport Service, Fort Mason, for transportation to the Philippine Islands, reporting upon arrival to the commanding general Philippine Department.

A board of officers to consist of Lieut.-Col. Arthur J. Hanlon, Maj. Albert D. Smith, and Maj. Emmett I. Vaughn (Medical Corps), is appointed to meet at Rockwell Field, San Diego, Cal., at the call of the senior member of the board for the purpose of examining officers ordered to appear before it to determine their qualifications for rating as military aviators or junior military aviators.

The board of officers consisting of Maj. Theodore C. Macauly, Capt. Richard D. Gile, and Capt. R. W. Pope (Medical Corps), appointed by par. 394, S. O. No. 195, W. D., to determine their qualifications for rating as military aviators or junior military aviators, is dissolved.

First Lieut. Rene R. Studler will proceed to Aberdeen Proving Grounds, Aberdeen, Md., and report for duty with 271st Aero Squadron.

First Lieut. Bertram E. Giesecke will proceed from School of Military Aeronautics, University of Texas, Austin, Tex., to Kelly Field, San Antonio, Tex.

First Lieut. Alfred R. Bellinger will proceed to Washington, D. C., and report to the Director of Air Service.

Maj. Howard F. Wehrle will proceed to Washington, D. C., for temporary duty, thence to Air Service Mechanics' School, St. Paul, Minn., and assume command.

The following-named officers, now at Akron, Ohio, will proceed to Langley Field, Hampton, Va.: Capt. Raymond C. Pierce, Capt. Elden P. Phillips.

Second Lieut. Allen B. Humason will proceed to Carlstrom Field, Arcadia, Fla.

Second Lieut. Charles F. Curry, Jr., will proceed to Washington, D. C., and report to the Director of Air Service.

First Lieut. Frederick W. Evans will proceed to Army Balloon School, Lee Hall, Va.

Second Lieut. John L. Day is detailed for duty with the Medical Department, and will proceed to Chicago, Ill., U. S. A. General Hospital 32.

First Lieut. Walter J. Enright to Washington, D. C., and report to the Director of Air Service.

Second Lieut. Laland M. Baum report to Army Balloon School, Lee Hall, Va.

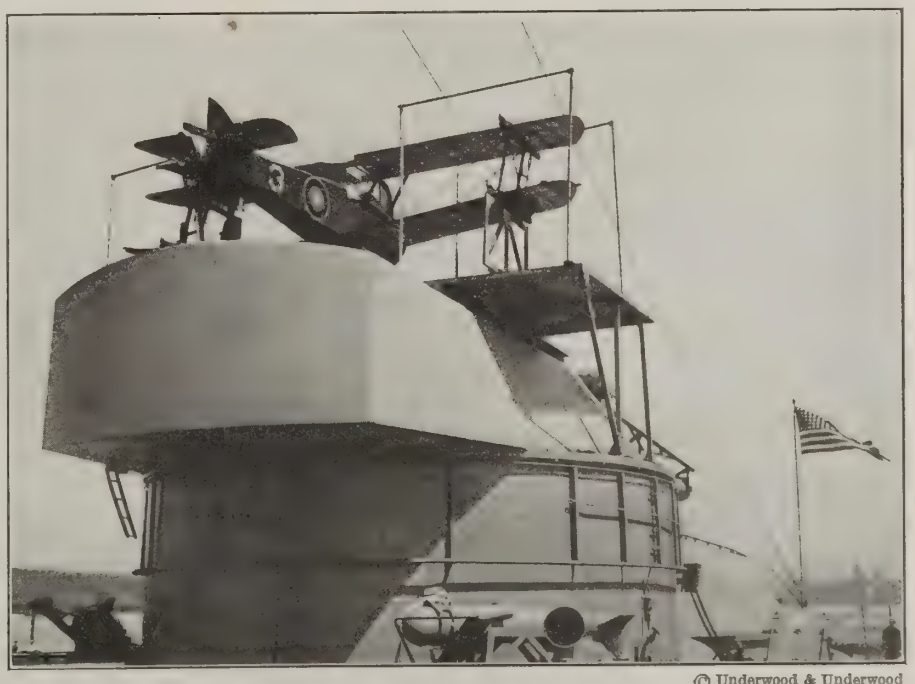
(*Continued from page* 589)

breaking in other flyers for instructors in stunts. June 10, 1918, he climbed to a height of 12,100 feet and made 105 consecutive loops landing out of the last one, using a JN4B Curtiss plane and motor (OX-5). On several occasion he flew from Ellington Field to Angleton, Texas, on hunting trips and fly back 12 or 1 o'clock at night, a distance of 75 miles. Lee has flown 15 different types of planes and 8 different types of motors.

Some of the Government aviators whom Lee has trained have won distinction in service at the front, one being Lieut. Ralph E. deCastro, who won distinguished war cross for bravery over the lines September, 1918, and he was formerly associate editor of AERIAL AGE .

Lee is credited with 3,000 hours of flying, 1,000 of which were spent in acrobatic flying. Barring an accident occurring during a heavy fog with no visibility and entirely beyond the control of the aviator, Lee's record is of the best, never having had an accident until April 4, 1919, mentioned above.

Pilot E. Hamilton Lee entered the air mail service on December 29, 1918, and has an excellent record for reliability in the delivery of his cargo.



© Underwood & Underwood

The aeroplane launching device aboard the U. S. S. Texas, on one of the big gun turrets

FOREIGN NEWS

Route of French Aerial Touring Contest Announced

The provisional list of stages in the preliminary trials in connection with the safety and comfort competition for which the "Echo de Paris" is offering $60,000 is now available. Starting from Paris, stops will be made at the following towns in France and neighboring countries: Nantes, Bordeaux, Toulouse, Barcelona, Nimes, Turin, Avignon, Geneva, Strasbourg, Brussels, London, and so back to Paris. Brief halts will be made at other places between these points.

Aeroplane Part of Antarctic Expedition Equipment

It is proposed to include an aeroplane in the equipment of the expedition to the Antarctic which is to be made under the leadership of Mr. John L. Cope, F.R.G.S., who accompanied the Imperial Trans-Antarctic Expedition, 1914-17, as surgeon and biologist to the Ross Sea party.

The expedition will leave this country in June, 1920, in the "Terra Nova," and return in 1926.

Inter-Scandinavian Flying Week

From the results of the recent Inter-Scandinavian Flying Week, according to *Flight*, it would appear that the Norwegian pilots made the best showing. A Danish aviator covered the greatest distance by flying from Copenhagen to Slagelse, a distance of 850 kilometres. Two Norwegian aviators came next, each flying over 775 kilometres over land and water on unfamiliar routes. The Swedish aviators did not complete the course. Of six Danish aviators only two finished. All the Norwegian aviators finished their flights.

Brackpapa Ascends 23,786 Feet with Three Passengers

Turin, Italy.—Lieut. Brackpapa, an Italian aviator, in an aeroplane with three passengers ascended on May 21 to a height of 7,250 metres (23,786 feet). The ascent was made in forty minutes.

French Aviator Reaches 28,800 Foot Altitude

PARIS, May 21.—The aviator Sadi Lecointe yesterday ascended to a height of 8,800 metres (28,871 feet), at the Villacoublay aerodrome, establishing a French record for height. This is only 29 feet short of Major Schroeder's record.

Aviator Delivers Lecture from 5,000 Foot Altitude

LONDON, May 16.—At an altitude of 3,000 feet a British aviator gave a lecture by wireless to members of the Institute of Electrical Engineers assembled in a hall in London, says a copyright dispatch to the New York Sun.

After describing the flight from his position in the air the aviator ended by saying he was "fed up" and rang off. This is the latest aeroplane wireless sensation.

Air Ministry Reports on Expenditures

A few details of the expenditure of the old Air Board and the Air Ministry (which succeeded the Air Board on January 3, 1918) during the year ended March 31, 1918, have recently been issued, as follows: Total expenditure, $10,763,679.20, which was expended under the following heads: Salaries, wages and allowances, $499,958.70; travelling expenses, $19,840.10; miscellaneous stores, $41,919.70; incidental expenses, $47,946.15; works and buildings, $11,597.20.

African Factory Contributed to British War Production

The works of the Maison J. Donnet at Sidi-Abdallah, Ferryville, Tunis, which are managed by Mr. Jeltés, and have turned out a number of Donnet flying-boats during the war, almost entirely by means of Moorish labor. The boats are assembled in the sheds and mounted on trollies on a railway. When passed as ready for use the engines are started and the machines propel themselves under their own power along 1,000 metres of railway down to the Lagoon of Bizerta, where they are launched direct off the trollies.

Martinsyde Plane Flies from London to Paris in 75 Minutes

London.—A new record for the London-Paris flight has been established. Starting with dispatches from Hendon Aerodrome at 3:20 P. M. on April 8th, and following the Dieppe route, involving a sea crossing of 70 miles, the pilot landed at Paris (Buc) in one hour and fifteen minutes after his departure.

As the distance from point to point is 215 miles, the average ground speed of the machine was 172 m.p.h. The machine was a Martinsyde single-seater scout, fitted with a 275 h.p. Rolls-Royce "Falcon" Mark III.

Lyons to Turin in 2½ Hours

Leaving Lyons in a gale, three Italian military pilots, in a 600 h.p. aeroplane, on April 23d flew across the Alps and landed safely at Cambiano, near Turin, the trip having taken two and one-half hours. On the way they encountered a heavy snowstorm.

Argentina Sends Aeronautic Mission to Great Britain

On May 5th there arrived in England an Argentine aviation mission composed of Captains Brihuega and Zuluaga and Engineer Paravella. The mission will visit most important flying schools and factories.

To Cover Vaudeville Circuit by Air

According to a British aeronautical journal, Mr. Frank Allen, managing director of Moss Empires, Ltd., has asked a well-known aircraft company to supply him with a machine capable of carrying two passengers and pilot at 100 to 120 miles per hour, for service upon the Moss' Tour throughout the United Kingdom, embracing over thirty variety theaters.

As soon as the official ban upon commercial and private flying is removed an experimental flight will be made.

Madrid-Seville-Madrid Flight in 4 Hours

Major Geoffrey de Havilland, R.A.F., who is sojourning for a time in Spain, has flown from Madrid to Seville and back, a distance of 480 miles, in four hours.

The machine used by Major de Havilland while giving exhibitions of flying was a De H 9 biplane with a 450 h.p. Napier engine. Major de Havilland is well known as the designer of the famous Airco machines.

Aerial Transport for Portugal

An aeroplane service will fly this summer between Barcelona and Lisbon via Madrid, Oporto, and Coimbra.

5,000 Farman Planes Tested Without Accident

Paris.—As evidence of the safety and reliability of aircraft, the record of Farman brothers, famous aeroplane construction, is of interest. All three brothers fly regularly, and M. Dick Farman daily. During the whole period of the war they have not had an accident to either pilot or machines in their reception tests or subsequent delivery to the army, and they supplied well over five thousand!

Chinese Government Orders Handley Page Planes

London.—The Handley Page Company has received an order through its agents, the Pekin Syndicate, for the supply of machines and personnel to the Chinese Ministry of Communications.

The first machines sent out will be of the twin-engine biplane type adapted to seat ten passengers and to carry 1,800 pounds of cargo. Experts and pilots be supplied, and the construction of aerodromes will be undertaken.



Austrian Lohner Flying Boat, many of which have been surrendered to the Italians

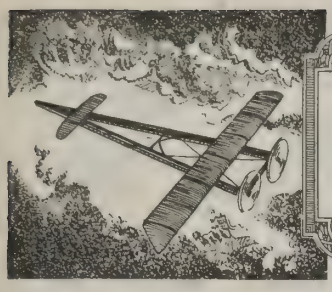
Brussels-London-Paris-Brussels Flight in 7 Hours 20 Minutes

Piloted by Lieutenant Georges and carrying two passengers, a Belgian two-engined army aeroplane has accomplished a circular flight from Brussels to London and Paris and back to the starting point, about 570 miles, in 7 hours, 20 minutes actual flying time.

First Cargo Carried in Foreign Trade by Aeroplane Reaches Havana

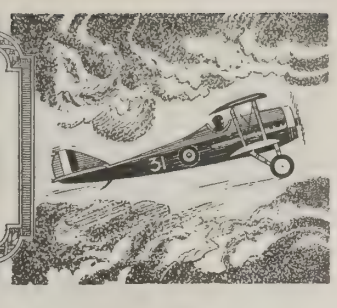
Havana, May 20.—The seaplane Sunshine, the first seaplane chartered for freight-carrying purposes between the United States and Cuba, arrived here on May 22 with a cargo of soap. The Sunshine was chartered by S. S. Friedlein, a Havana merchant, and the cargo came on a regular manifest with consular papers similar to those issued to ships.

The cargo did not pass the Havana Custom House, however, because the seaplane landed at Marianas Beach, and the holiday bathers there raided the plane and seized its entire contents as souvenirs. The aviators were an American, John Green, owner of the Sunshine, and Augustin Parla, a Cuban, formerly of the Cuban Army.



ELEMENTARY AERONAUTICS and MODEL NOTES

By John F. McMahon



Pacific Model Aero Club Contest

The Pacific Model Aero Club is now an auxiliary of the Pacific Aero Club and have just completed a very successful meet. Mr. Irvine of the senior Club is one of the board of directors of the junior body, as well as Mr. W. F. Hopkins, a gasoline motor designer, Mr. Mehre, a manual training instructor, and Mr. H. E. Hansen, brother of the President of the model club. It is the rule of this club that all members of the board of directors must be over 21 years of age.

The following officers of the new club hold office for one year from April 30, 1919:

Raymond C. Hansen, President; Theodore Morse, Vice-President; J. Laurence Irwin, Secretary, and Ray Ashley, Treasurer.

This club has signified its intention of starting in the Aerial Age Model Aeroplane contests and have entered the following team: Noble Heuter, Earl Vivell, Theodore Morse, Ray Ashley, Ralph Vincent, Laurence Pinkpank, Preston Hopkins, George Mullins, Raymond Eying, Edward Mascone, Raymond Fife, of Venice, Cal.; Daniel Tuthill, of Oakland, Cal.; Cleon Calway, of Valego, Cal.; George Ashley, Howard Morse, Raymond Hansen, Fred Geryine, Joseph Gutman, Laurence Irwin, Harold Hansen and Heubert Burgess.

The accompanying photographs show a meet being held by the club at one of the San Francisco parks, and the President, Raymond Hansen, holding his record breaking model.

This model has a span of 58 inches with a 7-inch chord, and double surface of gold beater's skin for covering. The front or elevating plane has a 20-inch span with 4½-inch chord and is single surfaced, being set at a greater angle of incidence than the main plane. The propellers are 18 inches in diameter and are cut from planks⅞x1⅝". The frame is 60 inches long. The wing spars are 3/16x¼" at the center and tapered to ⅛" at the ends. The ribs are located every 2½ inches and the trailing edge is made of 1/32x3/16" spruce. The wing tips are of thin bamboo strips. The bottom curve of the wing is slight, being only ⅛". The Lauder type of brace is used for protecting the machine in flight from buckling from the strain of the rubbers. Ten strands of 3/16x1/32" flat rubber are used on each propeller.

Although the model is large, it is a fast flier and very stable. It generally climbs to 150 feet at the start of its flight before straightening out. With only half the number of turns in the rubber motor it flew 2500 feet and had a duration of 100 seconds on the first tryout. On the second attempt with the same number of winds it flew 3000 feet and 110 seconds. The flights averaged 2000 feet and 100 seconds for the day's flights.

After the contest it was again tried out near the model owner's home and it quickly rose to 300 feet and helped by the wind disappeared over Golden Gate Park after circling around in the air for about four minutes.

Another copy of this model was built with 24" propellers but it broke in the air under the strain of a heavy wind.

A picture of this machine in flight high in the air was received, but it would not stand reproduction as it was too faint.

Theodore Morse flew a model weighing only 1.50 ounces for 2500 feet in 100 seconds. The propellers were 10 inches in diameter. Three strands of 3/16x1/32" flat rubber was used on each propeller. The main plane measured 25x5" and the front plan 10x3".

More is expected of this Club and I would not be surprised to see them well up in the contest for the Aerial Age prizes.

Although they are a new club, they have made wonderful strides and, from their records, they will soon be at the heels of the Illinois Model and Aero Science Clubs.

It is interesting to study the model shown in Mr. Hansen's hands. A beginner generally starts building the tiniest model he can think of, and wonders why good results are few and far between. Later he gets a glimpse of a successful model of the flying stick type and from that time on, improvement is rapid as will be noted from the results received from most of the smaller clubs in the country.

The model shown here is the right type of racing model and a good one to copy. The Lauder model shown last week is the forerunner of this kind of model, as are those built by the Chicago boys for the past two years.

The Christofferson Junior Biplane

The little machine shown in the cut to the right was built by H. P. Christofferson, San Francisco, Cal., in such a way as to be inexpensive and simple to construct. No expensive material is used and no wires or fittings are used in the fuselage in back of the pilot's seat.

The wing spread is 25 feet, and the length 16½ feet. The chord is 4 feet and the gap 4 feet 3 inches. The fuselage is built up of plywood sections. The complete weight is only 275 lbs. The power plant is an ordinary Indian motorcycle engine, with standard cams, ports, etc. A reduction gear allowing the engine to turn up to 3000 to the propeller 1200 R.P.M. is used. Overheating was eliminated by the use of deflecting plates of sheet metal attached to the motor. This machine was built for the price of a good motorcycle, or about $400. It has 175 square feet of surface, and a speed of 40 miles per hour. It has stick and foot bar control.

It is easy to construct and easy to handle for a novice who wishes to teach himself to fly. The wheels are 20x1⅝" and the tires double tube clinchers. The landing gear is made of steel tubing and fitted with shock absorbers. It has a two-gallon gravity tank over the engine.

The machine is shown well up and apparently flying with ease and without trouble.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

(Dear Reader:—We have tried to keep you fully informed on the subject of prohibition and aeronautics. Our esteemed British contemporaries have devoted considerable space to the subject. We take pleasure in presenting to you the musing of Aubrey England written after reading of the establishment of the passenger carrying service to the Bahamas, as published in *Aircraft.)*

In the morning, feeling thirsty, to my hangar I repair,
Get my spad out, tune the engine, take her leaping through the air;
Leave the "ferry" singing gaily, full of hope and full of cheer,
There's an inn in the Bahamas where I know they sell good beer.

Prohibition nearly killed me—many a noble man it's slain;
But I laugh at all life's worries, since I bought my aeroplane.
There's a girl who's waiting for me, and can hear me from afar,
Standing waiting with a beaker by the barrel in the bar.

There's no rule was ever written that the pen could not erase,
And so long as I'm a flyer I can beat the latest craze,
Speed my 'plane to the Bahamas, where in joy I'll glide right down
To the beer of good Old England in a tavern in the town.

—*Aubrey England.*

Old Mother Hubbard

Old Mother Hubbard went to her hangar
To give her pekinese his morning spin
But when she got there
The hangar was bare
For a thief in the night had got in.

Little Jack Horner
Is now quite a goner
From flying too awfully high;
He was heard to condole,
After he'd lost all control,
"What a doggone fool am I."

Clergymen Protest Against Sunday Flying

Washington, D. C., Friday (Associated Press dispatch).—The Sunday observance issue raised by the protest of churches and clergymen in many cities against flying circuses and exhibition of moving pictures in connection with the Liberty Loan was met by the Treasury in a decision to leave the question to each community affected. The Treasury has been flooded with protests against Sunday flying.

(In this connection, attention is called to the sin of breathing the air on Sunday. While this sin is not as flagrant as the one mentioned above, it should receive the attention of our guardians of morality).

Facing the Inevitable

"Jim," said the pilot, "we're going to do it; I can see the outlines of dear ould Oireland."

"That's so," mused the observer. "We've crossed the Atlantic; but why are you so melancholy about it?"

"I'm thinking of all those reporters who'll be waitin' for us. What am I going to tell 'em, Jim? Fact is, I can't remember having done an eventful thing in my life."—From *Aircraft.*

Late News from Count Zeppelin

"Whew! But it is hot. I wish I had one of my airships to fly away in."

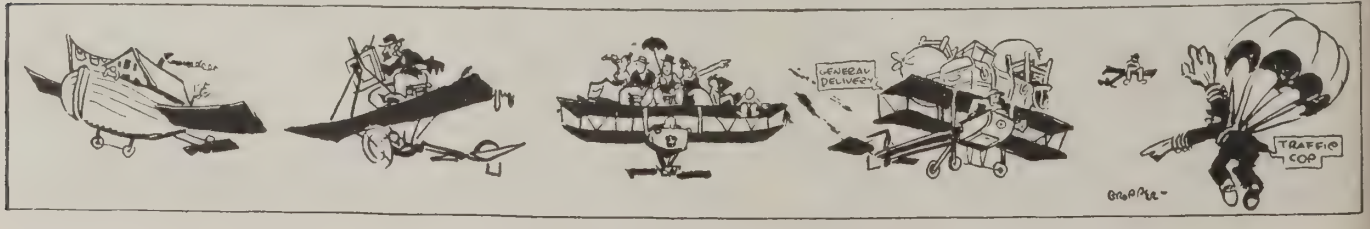
"You shut up, Count Zeppelin," said his Satanic majesty. "You know as well as I do that your gasbags met hell halfway to Britain and couldn't stand it. What's the good of talking about impossibilities?"—*Aircraft.*

I asked my mother for fifty cents
To fly in an aeroplane over a fence,
But it flew so high, that it reached the sky,
And never came back till the 4th of July.

There was a young lady named Hopter,
Who invented a new helicopter;
She rose up all right:
When she tried to alight,
It made for a ditch, and there flopt 'er.

—From *Aircraft.*

Hey diddle diddle, my plane is a divvil
And with it I'll hop o'er the moon;
Other pilots may laugh and hand me the gaff
But I'll show them all up very soon.



When aeroplanes become so common that they do not bother the man with a boil on the back of his neck

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

Lewis and Vought *insisted* on Valentine's finishes

HERE is a letter from the Lewis and Vought Corporation, of Long Island, N. Y., successful manufacturers of Training Planes, that speaks for itself:

"As you know, the Vought VE-7 Airplane, designed by Mr. Chance M. Vought, was adopted by the U. S. Government for its standardized advanced training airplane to displace other types in use or on order.

"We insisted, in the Government specifications as standard finish of these machines, that the following Valentine products be used:

"Wood parts: Valentine's Wood Filler, and Valentine's Valspar;

"Exterior Metal Parts: Valentine's Blue and Black Enamel (baked on);

"Interior Metal Parts: Valentine's Valspar;

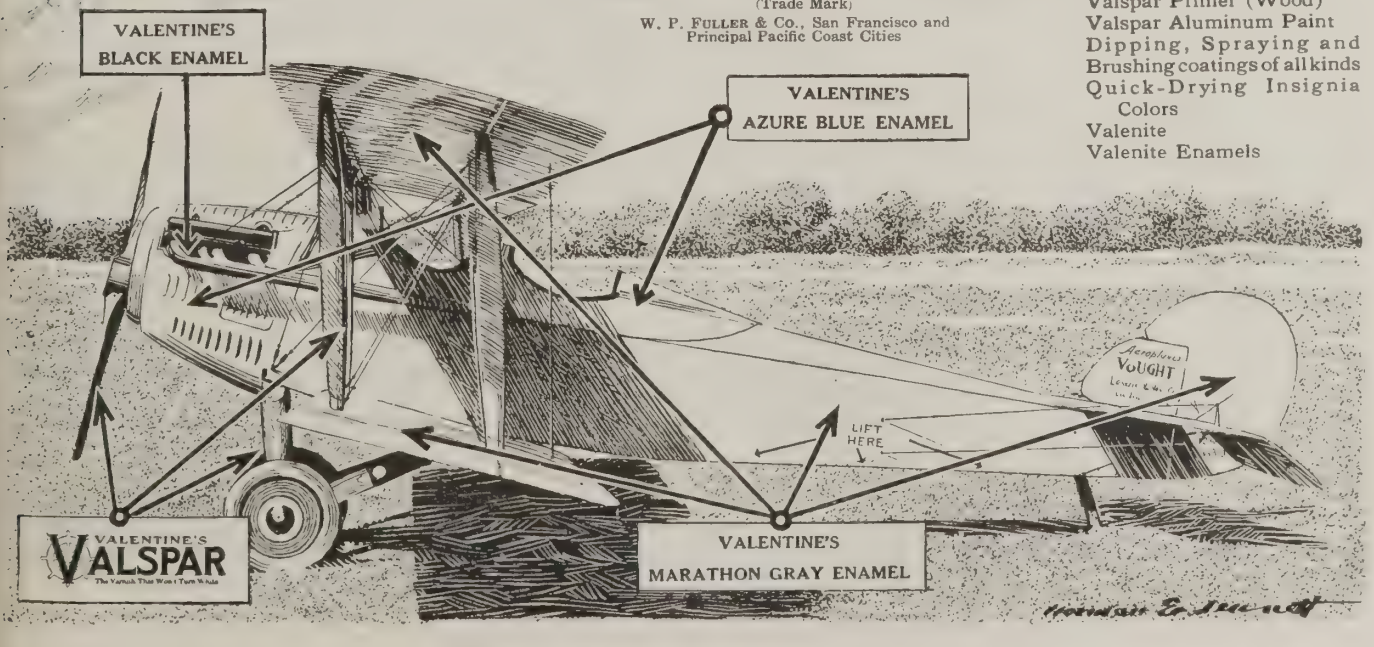
"Fabric Finish: Valentine's Special Marathon Gray Enamel."

Other Airplane Engineers and Production Superintendents are learning to *insist* on Valspar Varnish and other Valentine finishes because they have learned that they can depend upon them.

VALENTINE & COMPANY
456 Fourth Avenue, New York

Largest Manufacturers of High-grade Varnishes in the World
ESTABLISHED 1832
New York Chicago Boston VALENTINE'S VARNISHES (Trade Mark) Toronto London Amsterdam
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Dipping, Spraying and Brushing coatings of all kinds
Quick-Drying Insignia Colors
Valenite
Valenite Enamels





Aircraft Advertising Agency, Inc.

280 Madison Avenue
New York

Telephone 1556 Vanderbilt
Cable Address: "Aero-Ads"

"AERO-ADS"
by
"AERO EXPERTS"

THE members of the *Aircraft Advertising Agency, Inc.* are all ex-officers of the United States Army Air Service, with both theoretical and practical knowledge in the Aeronautic Field, assuring expert service for clients.

GRANVILLE A. POLLOCK, President of the *Aircraft Advertising Agency, Inc.*, previously to his release from the Army with the rank of Captain, served in the war from its beginning and was a member of the famous "Lafayette Escadrille." In addition to this war aviation service, Captain Pollock is by profession an aeronautical engineer.

S. HERBERT MAPES, Vice-President of the *Aircraft Advertising Agency, Inc.*, is another Air Service Captain who has recently laid aside his uniform after having served in important capacities at various aviation training fields in this country. He is well known as an automobile racer, an exhibitor of saddle horses and a winner of Horse Show Blue ribbons, as well as being a member of many prominent clubs.

REED GRESHAM LANDIS, of Chicago, son of Judge Kenesaw M. Landis, is also a Vice-President of the *Aircraft Advertising Agency, Inc.* Besides having been a Major in the American Air Service, he has the added distinction of being the second ranking American "Ace" with 12 Air Victories to his credit.

WILLIAM MENKEL, Secretary of the *Aircraft Advertising Agency, Inc.*, also served as a Captain in the Air Service, holding various positions at Washington and in the field, including that of Commanding Officer of the Aviation Repair Depot at the Speedway, Indianapolis, Ind. Previously to entering the service, Captain Menkel was for more than 15 years associated with the American Review of Reviews.

The AIRCRAFT ADVERTISING AGENCY, INC. aims to cover the advertising field for aeronautics, including:

DISPLAY ADVERTISING for General Advertisers on Dirigible, Kite, and Spherical Balloons, Aeroplanes, Streamers from Aircraft, and by the dropping of Souvenirs and Handbills from the Air;

PREPARATION of COPY and SKETCHES and the PLACING of ADVERTISING for manufacturers of Aircraft, Accessories, and Aviators' equipment in aircraft and other periodicals.

AERIAL PHOTOGRAPHS of Cities, Summer Resorts, Country Places, Real Estate Developments, Etc.

RATES ON APPLICATION.

The Aircraft Advertising Agency, Inc. is now booking the space for exhibitors at the **Second Pan-American Aeronautic Convention and Exposition at Atlantic City, N. J., May 1 to June 1, 1919,** and also has charge of the preparation of the elaborate souvenir Program, advertising rates for which may be had on application.

The Aircraft Advertising Agency, Inc. also controls advertising space on Aeroplanes, and kite and Spherical Balloons operating from the permanent Aviation Field at Atlantic City, N. J., and on the 36,000 square feet of Bill Board space on the fence of this Aviation Field.

(*Continued from page* 574)

ter J. Pyeatt, St. Louis, Mo.; Private Justin D. Dorbant, Houston, Tex.; Private Hayes S. McMurray, Spokane, Wash.; Private James Smith, San Francisco, Cal.

Some of the naval aviators were: Lieut.. (J. G.) Harry E. Adams, Pensacola, Fla.; Ensign Hugh J. Adams, Pittsburgh, Pa.; Ensign Spencer T. Alden, Fort Wayne, Ind.; Ensign Junius F. Andrews, Durham, N. C.; Ensign Edmund B. Barry, Rochester, N. Y.; Ensign Louis Bergen, Long Island City, N. Y.; Ensign Arthur L. Boorse, Birmingham, Ala.; Ensign Milton D. Brice, South Minneapolis, Minn.; Lieut. (J. G.) John S. Buchanan, Boston, Mass.; Ensign Thomas W. M. Draper, Brighton, Md.; Ensign Philip B. Frothingham, Portland, Me.; Ensign Benjamin L. Lee, Jacksonville, Fla.; Ensign Eric Lingard, Annisquam, Mass.; Lieut. Kenneth MacLaish, Blencoe, Ill.; Ensign Allen L. Nichols, St. Paul, Minn.; Ensign Phillip W. Page, Washington, D. C.; Ensign Lloyd A. Perry, Oconomowoc, Wis.; Ensign Stephen Potter, Detroit, Mich.; Ensign Edwin S. Pou, Smithfield, N. C.; Ensign Harold A. Pulliam, Lexington, Ky.; Ensign Curtis S. Reed, New York; Ensign Fred Eries, Aurora, Ill.; Ensign Daune H. Ruttledge, Robelin, La.; Lieut. (J. G.) Arthur Fuller Souther, Cleveland, O.; Ensign Albert D. Sturtevant, Washington, D. C.; Ensign Elmer B. Taylor, Cedar Grove, N. J.; Ensign Hugh Terres, Kensington, London; Ensign M. Terrier, Baltimore, Md.

The aeronautic authorities assembled at Atlantic City for the Pan-American Convention are keeping close touch with the Trans-Atlantic flight and have issued interpretations of the value of the achievements of the Trans-Atlantic fliers, which have been printed the world over.

Scores of technical papers of great value to the aeronautic movement have been presented to the convention, which will be published in future issues of AERIAL AGE.

Great interest has been manifested at the Airport by the arrival of two Sopwith machines. The machines will be piloted by Capt. Mansell R. James, late of the 45th Squadron, R. A. F., and Lieut. Alan L. Clark, 46th Squadron, R. A. F.

They will fly two machines of a type never before seen in America. These are Sopwith Camels, so called because of the hump for the Vickers machine gun mount in front of the pilots seat. The planes, which are owned by the two pilots in partnership with Cecil James, a brother of the Captain, were landed in New York from the Orduna on May 17 and immediately brought here to be made ready for the prize flights.

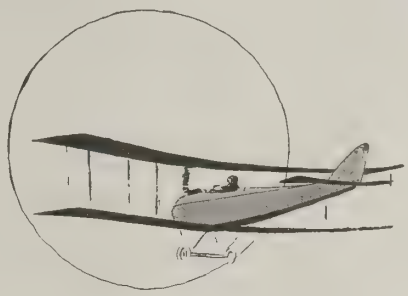
It is the avowed intention of James and Clark to make their first flight from here to Boston, 350 miles, on a straightaway. They intend to return here the next day, and on the following day to start out for Cleveland and Detroit, winding up at Toronto. In all these cities, cash prizes will reward the best flights from Atlantic City during the month, and the records will count also for the Pulitzer Trophy.

The Sopwith Camel is a very light single-seater, with a wingspread of twenty-nine feet and an overall length of nineteen and one-half. Its power plant is a nine-cylinder Bentley rotary motor, air cooled, rated at 150 to 175 horsepower. The ordinary gasoline capacity is twenty-five gallons, but extra tanks now being installed will double this. The cruising speed is 120 miles an hour, with a maximum of 140.

The Camels had a distinguished war record, having been used by some of the most noted aces. James himself is a war pilot of distinction, having been officially credited with nine Teuton planes on the Italian front. He was downed himself on the Cambrai front, in December, 1917; was in several German prisons, and three times escaped and was recaptured. He is twenty-five and Clark is twenty-one.

James took up one of the Camels for a try-out flight of twenty-five minutes and flew to an altitude of 6,000 feet, passing out of sight of spectators. On the return he raced around the Airport Field, to show the speed of his mount.

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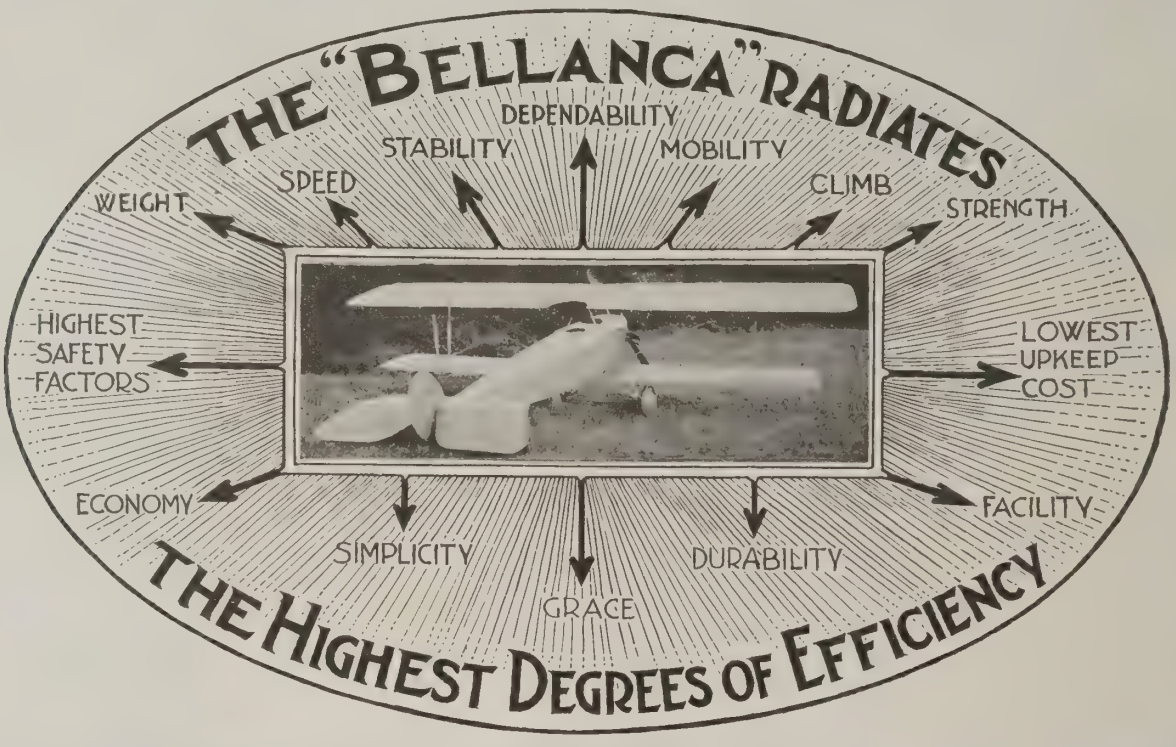
Charles H. Payne, Ensign Naval Aviation; J. W. Moore, Richardson, 1st Lieut. U. S. Inf.; Major Landis; Granville A. Pollock, Capt. U. S. Air Service; S. Herbert Mapes, Capt. U. S. Air Service; William Menkel, Capt. U. S. Air Service

14

FOURTEEN VITAL POINTS

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Two Flyers Fall 200 Feet to Death.—(N. Y. Times)

"Atlantic City, May 24.—Beryle H. Kendrick, pilot, and James H. Bew, Jr., a passenger, were instantly killed this evening. E. Kenneth Jaquith, Kendrick's business associate and flying partner, said he could give no explanation for the tragedy other than that it was due to accident."

But there's a reason, and there is a remedy, which if generally known would cause a public demand for substituting these dangerous, unstable types with a stable and safe airplane that will not "nose-dive," somersault, "side slip" or "tail-spin" to these numerous deaths.

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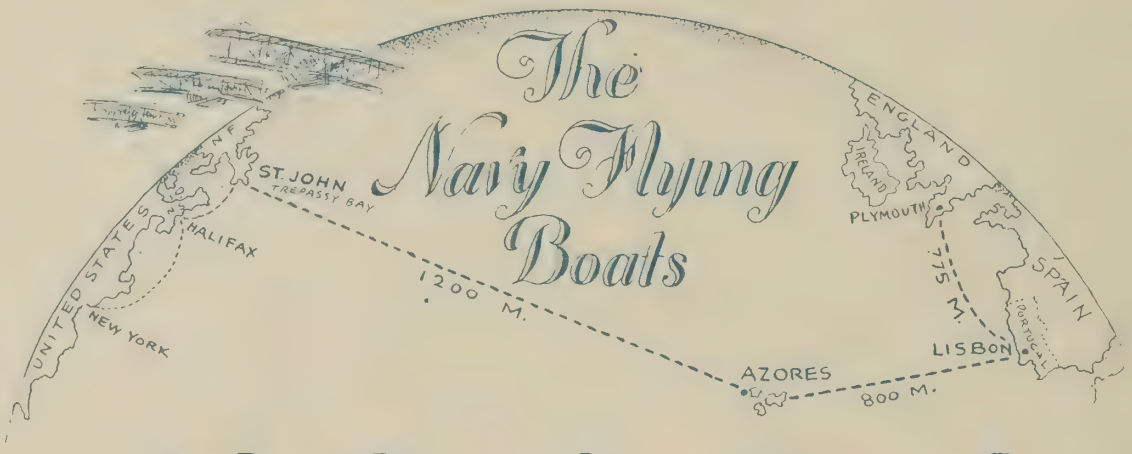


The NC-4 Aloft, As Seen From One of Her Companion Flying Boats

Greater Development of American Aeronautics Urged at Atlantic City Convention

PUBLISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY

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GREATER DEVELOPMENT OF AMERICAN AERONAUTICS URGED AT ATLANTIC CITY CONVENTION

THE country and the press are applauding the Second Pan-American Aeronautic Convention. For thirty-two consecutive days this convention, with the demonstrations at the Atlantic City Airport, has been educating the country to the marvelous future of American aeronautics, and has aroused interest in aeronautics among the hundreds of thousands of people of different lines of endeavor.

The representatives of thirty-two countries attended the Convention, and they were unanimous in stating that this was the greatest and most constructive convention ever held. The fact that the Convention and Exposition resulted in the sale of not less than 150 aeroplanes is an evidence of the tremendous public interest created. It has given American aeronautics a new start, a veritable flying start.

Urge Greater Aeronautical Development

The convention adopted resolutions urging upon Congress the adoption of a liberal program of the development of aeronautics, including the establishment of engineering schools in every state along the plans of the state agricultural colleges and experiment stations to do for aviation what the latter have done for agriculture.

The resolutions, which received the unanimous endorsement of the Aero Club of America and the Aerial League of America before it was introduced and passed amid much enthusiasm, read:

"Whereas, It is universally conceded that the development of the natural resources of the United States, together with the encouragement of American industries and commerce of all kinds, is one of the most vitally important matters for the consideration of the Special Session of Congress, and

"Whereas, It is obvious that organized engineering and industrial research is one of the most important and necessary factors in such development of our natural resources, industries and commerce, and

"Whereas, The art of flying has been so far developed that the use of flying machines of various kinds has taken a permanent place in the commercial life of the nation as well as in the equipment of the American Army and Navy, and

"Whereas, the art of flying and the devices for flying and minimizing the dangers of flying have only begun to be developed, and need the broadest encouragement, and

"Whereas, The establishing of engineering experiment stations in each state and territory for the promotion of engineering and industrial research as a measure of industrial, commercial and naval progress and preparedness in time of peace or war is one of the most important steps which Congress could take at this time in the encouragement of further progress in the art of flying, and the development of men trained in research along all lines bearing upon the art of flying and the construction of flying equipment, and

"Whereas, There is a bill before the Special Session of Congress, known as the Smith Howard Bill, proposing the establishment of the said engineering experiment station, the work of which includes aeronautics, aerodynamics and many other researches and investigations bearing upon the art of flying and the production of materials needed in the art of flying;

"Therefore, Be It Resolved, That the Second Pan-American Aeronautical Convention, in executive session, Atlantic City, New Jersey, express its unanimous endorsement of this Act by the Congress of the United States in making appropriations for the establishing of the proposed engineering experiment stations, and also the hope of this body that Congress will by this Act give this encouragement to American engineering and industrial research without further delay."

The resolution followed the report presented by Henry Woodhouse.

"The flight of the NC-4 has opened the way for non-stop transatlantic flights," said the report. "But it is evident that to make such voyages it will be necessary to revolutionize aeroplane construction.

"A flier capable of crossing from Atlantic City to Paris, for instance, will have to be three times as large as the NC-4. One of the most important features of the NC type machines is that the lift is thirteen pounds per square foot of wing surface, whereas the maximum lift per square foot of wing surface in aeroplanes heretofore has been only nine pounds to the square foot. These four pounds represent a great gain when it is considered that the NC weighs more than 25,000 pounds. This gain makes it possible to think of building an air liner capable of crossing from Atlantic City to Paris. But such an aeroplane will have to lift a load of over 100,000 pounds, including the commercial load, and therefore it will require not less than 10,000 square feet of wing surface.

"This can be done, although it will require a different arrangement of the wings from that now followed in aeroplane construction. A biplane which would do this would need a wing span of 171 feet and a chord of over 28 feet. But these dimensions are unwieldy, and, anyway, we are not going to stop with a machine that will lift fifty tons.

"The only way to get them is to have more planes or wings. Caproni has done this with his great triplanes. But is there any reason why we should stop with three wings? Why not have four, five, or a dozen? The idea of tandem wings was applied by Professor Langley in his plane many years ago, and therefore it is not new, nor is the idea of multiplanes. But to apply these ideas to the construction of large machines involves solving new problems.

"How are we going to construct a body or fuselage for this multiplane? We must provide spaces for cargo in such locations so as to make them readily accessible and at the same time to make the movement about the center of gravity of the whole machine either comparatively small or else nicely equalized, in order to prevent undesirable flying defects. The problem of fuel storage is also present. The machine would be multi-motored, and the location of these motors and their fuel supply will involve a large amount of careful planning.

"Furthermore, if our plane is to be a passenger carrier, comfortable quarters must be provided. Here again we must try to emulate the standards of yacht and ship builders. We should try to locate our passengers so that they could obtain an unimpaired view, since this is one of the supreme joys of an air voyage.

"The type of multiplanes will also involve problems. If it

is to be a flying-boat type, it must be made strong and seaworthy, and at the same time not unduly heavy. If we are planning a land machine the landing gear must be proportioned to withstand the heavy loads, with a good factor of safety, and yet not offer too much air resistance in flight.

"We recall that the Avron triplane at the Boston-Harvard meet, September, 1910, had the tendency to topple over at the least cause. That established a traditional prejudice against triplanes and quadruplanes. But the height of aeroplanes has gone up, and although the prejudice still remains, the height of aeroplanes is increasing year by year. The Porte triplane is over 27 feet 6 inches high; the Caproni triplane is over 19 feet high; the Gotha-Zeppelin is 21 feet high; the Voisin triplanes 18 to 19 feet high; the Handley Pages are 18 to 20 feet high, and the NC type is 19 feet high.

"But there is a limit to the piling of one plane on top of another for the reason that you soon make the machine so topheavy that it is hard to fly and almost impossible to land without turning a somersault. So we have got to find some other way of arranging our extra wings if we are to have them. If we tried to build a triplane with 10,000 feet of surface it would have to be about 50 feet high, and I shouldn't like to be in it when it tried to land.

"But suppose we make it a quadruplane, and instead of putting our four wings one above the other we put one pair in front and another pair back of them. We can go on adding more wings at will, grouping them in sets so that we can increase the lifting surface beyond anything that is considered possible now and yet without making a topheavy machine. It is up to our aeronautical engineers to work out these problems, and I prophesy that they will do it in the near future.

"Congress should allow the funds necessary for the Army, Navy, and Post Office to conduct the experiments necessary to develop these huge planes. To the Navy these large planes will be regular flying torpedo boats, carrying several full-sized Whitehead torpedoes and going at 100 miles an hour. To the Army it will mean having aeroplanes capable of carrying 3-inch guns, which would be most potential weapons for coast defense and for preventing the landing of enemy forces on American soil; to the Post Office it will mean delivering mail between New York and San Francisco and from the United States to England, France and Italy without stops. It is a most important development which should be supported by Congress. It will bring about commercial transportation by air on a large scale and will solve some of the most difficult problems of transportation."

Aerial Forest Fire Patrol

The aerial timber "cruiser" is the newest commercial development of the aeroplane and the flying boat. Vast tracts in the northwest, rich in mineral deposits and fine timber, are shortly to be placed under the scrutiny of experts through the use of aircraft, contracts for such surveys having already been awarded to the pioneer commercial air line formed for that purpose, according to Lieut. Col. R. B. Girouard, a Canadian engineer-flyer, speaking before the Second Pan-American Aeronautic Congress.

"The possibilities of the flying boat and hydroaeroplane as a means of transprotation into the interior of Canada is becoming more apparent every day. It gives a unique opportunity for the hundreds of trained flyers who received their schooling during the war. The owners of big timber and mineral tracts are recognizing now that the flying machine offers the quickest, easiest and cheapest means of securing the information that will lead to the development of the richest kind of territory.

"Heretofore it has been necessary to send out experts and guides to make these prospecting trips. It was arduous work that entailed great expense and months of travel. But now aircraft are preparing to change all of this. The flying boat and the hydroaeroplane are the logical means of mapping out and investigating the resources of this country, because more than twenty-five per cent of the area is water, and there is good landing always in sight on the rivers and lakes to which the flyer could drop at any time.

"The plan being followed out is to divide the areas up into blocks that are numbered. The cruiser flies to the particular block he wishes to prospect, secures samples of the minerals or timbers and in addition to laying out maps also secures aerial photographs, so that when he returns to the headquarters of the projecting company he is able to show not only the products, but also by actual photographs point out how the stuff is located and point out the best meas of transportation. There is one strip 250 miles long and 30 miles wide that such prospecting is to be carried out on shortly, the contracts having already been signed.

"Reference to the Dominion and Provincial Geological reports will satisfy anybody of the great possibilities of this north country, especially in Northern Quebec and Ungava. Twelve years ago the Ontario Government projected and built the Temiscamingue and Northern Ontario Railway from North Bay to Cochrane, resulting in the opening up of the famous Cobalt Silver area and the Porcupine Gold Fields and the Abitibi Clay Belt were added to agricultural areas of Ontario and timber and pulp wood limits were thrown open to the public for development. These same latitudes produced east into the Province of Quebec are as yet undeveloped. In fact, I might say, unexplored, but the reports brought in by surveyors, geologists and sportsmen all tend to prove that Northern Quebec has at least the same possibilities as Northern Ontario.

"The projection of railroad surveys, the traverse of rivers and lakes by aerial photographs, in fact, the securing of information in detail heretofore impossible to get, except in a very rough and general way—information valuable to the government, the investor and the public at large, is awaiting the aerial pioneer.

"The prospects not only hold good for the timber and minerals, but in the transportation of valuable cargoes of furs and fish. You read only the other day of a Canadian aviator making a trip from the interior of Canada to New Jersey with an aeroplane full of fine pelts."



President Alan R. Hawley, of the Aero Club of America, Secretary Augustus Post, and Mr. Henry Woodhouse greeting Capt. James at the Atlantic City Airport.

Duplex Telephony Demonstrated

First public demonstration of wireless duplex telephony was given before officials of the Convention through a small system installed by experts of the General Electric Company. The instruments, connected up in the Atlantic City Yacht Club, were employed to receive and send telephone messages to the cruiser "Rosemar," anchored in a basin a half mile from the clubhouse, Earl Ovington, an engineering wizard of the Curtiss Company, owner of the boat, collaborating with the other demonstrators. The audience was first permitted to talk and receive at the same time with the same ease with which the modern telephone with wire connections is used. Later a musician was placed aboard the cruiser, and when he played a solo, it was delivered to the audience at the clubhouse through an amplifier.

Mr. Alexanderson, inventor of the new system, described just how the instrument worked. In explaining the new wireless apparatus he said: "Just imagine a man standing a hundred feet away from you, trying to talk to you in a whisper, and then a second man alongside you, with a megaphone, talking at the top of his voice into your ear. You wouldn't have a chance of hearing the whisper. Yet this is just the condition which confronted us when we tackled the problem of duplex wireless telephony.

"As developed during the war, the wireless telephone made it necessary to have a switch and throw from receiving to transmitting in order to operate. In other words, when a man wanted to talk on the wireless telephone he would throw a switch, say to the left, and that would operate the transmitter. When he wanted to receive the spoken word from the other station he would throw the switch to the right and that would throw in the receiver. But he could not receive a message and talk at the same time as you can on an ordinary telephone. When you receive and talk at the same time,

that is called 'duplex.' In the case of the wire telephone it is a comparatively simple matter, as you can lead the currents along the wires, but with the wireless 'phone the current comes through the ether of space, and the powerful transmitting current swamps out the delicate receiving current, so that the two cannot operate under ordinary conditions.

"In duplexing by wireless, powerful transmitting currents go out from the station, and at the same time the delicate receiving currents come in. The problem is to so adjust things that the receiving instrument is dead to the transmitting currents which go out from its own station, but receives the signals from the distant stations. And as its own signals are, of course, right next to it, they are very much more powerful. In other words, the most powerful signals must be blotted out, or counteracted, and the delicate signals from the



Lieut. Alan Clark and Capt. M. R. James, the Sopwith pilots at the Atlantic City Airport

distant station received. And that is the problem which confronted the wireless telephone experts, and that is the problem which they solved."

Sopwith Demonstrations

Lieut. Alan Clark, late of the Royal Air Force, thrilled throngs with the stunts he performed with a Sopwith "Camel" scout machine, tearing through space at 130 miles an hour as one of the final tests of different type machines for commercial adaptability of the Second Pan-American Aeronautical Convention. The machine, which was immediately dubbed the "flitter," skidded through the atmosphere with such terrific speed that the operator was able to stand it directly on its wing tips in a vertical position in making banks and on the straightaway it showed twice the speed of other machines hovering over the field.

The Sopwith climbed 5,000 feet into the air in a twinkling, and then Lieut. Clark put it into a tail slip with its nose pointed straight up. The machine spun around like a giant top for a full minute, then dipped suddenly into a nose spin for a 2,000-foot gimlet toward earth, from which level it was permitted to go through all the stunts that made such wonderful records for the scouter on the Italian and French fronts.

Parachute Demonstrations

The convention held the final tests last week for the mail delivery system from an aeroplane with the use of "petite" parachutes, each capable of carrying the weight of 1,000 letters, more than would be the average delivery at any one community along an aerial mail route. The aeroplane of Eddie Stinson was hitting it up at 70 miles an hour when Lieut. Jean Ors, inventor of the parachute, released six parachutes in a row at second intervals. They clustered after their release and deposited 25-pound bags of sand within a radius of 18 feet on the field. Government officials are to be brought here next week to witness the parachute mail tests with the idea of securing their adoption for the sky mail routes. With their adoption it is certain, officials declared, that the delivery of mail will be greatly expedited, because the aeroplane mail express will be able to continue its flight without slowing up.

There were further demonstrations of aerial life preservers, the Watkins and Ors type parachutes being used with great success in dropping out passengers from varying altitudes to a safe landing on the field. George Weiss, of Pittsburgh, a former navy balloonist, tested out the Watkins chute while Warner Genot, a Belgian, leaped from speeding aeroplanes with the Ors chute.

Because the students at the big colleges were busy with their final examinations, it was necessary to postpone the Intercollegiate Aeroplane Contests. They will be renewed the last Saturday in June, and be continued each Saturday for the balance of the summer. Yale, Harvard, Dartmouth, Pennsylvania, Princeton, Colorado, Columbia, Amherst, California and Tufts are to battle it out for the supremacy of the air during the summer here, both over land and sea, in the land and seaplanes.

Constructive Service to Aeronautics

A remarkable case of devotion to the aeronautic movement was revealed at the Second Pan-American Aeronautic League of America's Diploma of Honor to Mrs. A. S. Abell, of Baltimore and her five sons, two daughters and her daughter-in-law.

Every one of the following nine members of the Abell family are members of the Aerial League of America: Mrs. Arunah Shepardson Abell, Mr. Arunah Shepardson Abell, 3rd, Miss Margaret Anna Abell, Mr. Edwin Franklin Abell, 2nd, and Mrs. Abell, Mr. Walter William Abell, 2nd, Mr. George William Abell, Mr. Robert Louis Abell, Miss Marie Louise Abell.

The five sons are also members of the Aero Club of America.

The oldest member of the family, Mr. A. S. Abell, 3rd, is 26 years old; the youngest member is Miss Marie L. Abell, who is only 16 years old.

The entire Abell family, which is well known through its being connected with the Baltimore "Sun," has followed aeronautics for the past ten years, every member being interested in it, and they all came to Atlantic City for the Second Pan-American Aeronautic Convention and Exposition, where they have stayed for the entire convention.

As there are to be conducted extensive scientific contests and demonstrations of the application of aircraft for different purposes, Mrs. Abell held a family council, and the family unanimously decided to live in Atlantic City for the summer, and they took a large residence only a few hundred feet from the Atlantic City Airport, which was christened "Pilot's Port and Aeronautic Arcadia."

Mr. A. S. Abell, 3rd, the oldest son, has presented a trophy, to be competed for annually in races between Atlantic City and Baltimore.

The trophy was presented through the Aero Club of America and Aerial League of America, who will draw the rules for the competition.

Throughout the war the Abell family has participated in, and supported in many ways the progressive work of the Aero Club of America and the Aerial League of America, which contributed so extensively to the building of the American Air Forces, and assisting American Airmen in many ways.

Rear-Admiral Robert E. Peary, the President of the Aerial League of America, was to present the Diploma of Honor to the Abell family, but his illness prevented his coming to Atlantic City from Washington. In sending his regrets he stated that Mrs. Abell and her five sons and two daughters and daughter-in-law have set an example which American families ought to follow at this crucial time in the history of American aeronautics, when, unless the American public supports the aeronautic movement in every way possible, America will again fall behind other countries in this marvelous field of human endeavor.

Mr. Alan R. Hawley, the President of the Aero Club of America, who took the place of Admiral Peary in making the presentation, stated that the devotion of the Abell family to aeronautics has been one of the most inspiring factors to him and other active workers in the Aero Club of America and Aerial League of America.

Aerial Photographic Bombardment

The resort's beachfront was "shot up" by an automatic camera gun that "mowed down" promenaders along the Boardwalk with the same precision and rapidity of a machine gun. Mounted with a swivel arrangement on the cowl of a Curtiss seaplane, the camera, an invention of E. C. Bass, of New York, registered "bull's-eyes" up to 5,000 feet when operated by Mr. Bass.

The camera has many of the characteristics of a regular machine gun, being sighted as quickly and by the same methods and operated by a trigger that pumps the "shots" over at the rate of the fire of the best machine guns. The shots were made singly and in bursts, the shutter continuing to operate continuously while the finger was on the trigger or making a lone picture on "sniping" shots.

The Bass camera gun is a day-light loading device, making

it possible for the "gunner" to snip off any part of the moving picture film used in the bright sunlight without ruining the film. It has a capacity of 100 feet of film with room for 1,600 pictures, and while the photographs are not moving pictures, they are taken in much the same manner, following one after another along the line of the film.

The camera itself is removable from the gun so that the latter may be left on the mounting and is sufficiently adaptable to be used in any position. Every picture automatically registers on a timer and number, so that the operator always knows the exact number of pictures he has taken and the time each snap was made.

Mr. Bass originally designed the device to be used in training machine gunners, the wonderful accuracy made possible by the "hits" registered being used very successfully by the French aerial machine gunners. With a number of changes it has now been perfected for commercial purposes and will be employed for surveys and general topographical work, for aerial police work as well as improving the marksmanship of flyers. An Aerial duel will be fought later in the week between operators in two seaplanes over the ocean. By the timing device connected up with the trigger it will be possible for the judges to discover which "gunner" "killed" the other first as well as reproducing pictures that will show the number of bull's-eyes made.

Mr. Bass also demonstrated a "moviette," a small, compact moving picture camera measuring eight inches long, five and one-half inches wide and three inches through. Many of the principles employed in the camera gun are used, but instead of a trigger a handle is used to flash the shutter, turned like that of the ordinary movie camera. This little camera, weighing but three and one-half pounds, was taken aloft over the Atlantic City Airport and its developed films were sharper in detail than any taken thus far from an aeroplane during the Pan-American Aeronautic Convention. Because of its light weight and small measurements, the operator had great freedom of movement, and the demonstration won high praise from notable experts.

Sporting gunnery contests will be held with the camera gun later, the records of marksmanship being submitted to a competent board of judges. Every effort will be made to introduce this sport among the colleges as a means of creating a most valuable reserve of aerial expert gunners ready for any sort of an emergency.

Contest Winners

The Contest Committee of the Second Pan-American Aeronautic Congress in its report announced the winners of the various contests staged in connection with the annual convention here throughout the month of May. Awards will be made on June 5th. The following results were given out:

Opening Day, Seaplane Race—E. K. Jaquith, Atlantic City to New York; passenger, Harold Willets; time, 1 hour and 45 minutes; first prize, $500; Curtiss F-boat. B. H. Kendrick, Atlantic City to Perth Amboy; passenger, E. L. Reed; time, 2 hours; second prize, $250; Curtiss F-boat.

Opening Day, Land Plane Race—Roland Rohlf, Westbury, L. I., to Atlantic City; passenger, Victor Hugo Barranco; time, 2 hours and 8 minutes; first prize, $500; Curtiss Oriole. Edward Stinson, Queens, L. I., to Atlantic City; passenger, Lieutenant G. W. Shaw; time, 2 hours and 33 minutes; second prize, $250; Curtiss JN-4.

Intercollegiate Seaplane Race, May 3d—Pennsylvania, S. R. Beckwith, first prize, $250; Columbia, Ensign W. S. Martin, second prize, $150; Yale, Ensign A. A. Beckwith, third prize, $100; Amherst, Augustus Post, fourth prize, $50.

Intercollegiate Land Plane Race, May 3d—Columbia, Lieutenant A. L. Smith, first prize, $250; Yale, Ensign A. A. Beckwith, second prize, $150; Columbia, Lieutenant G. S. Lennstrand, third prize, $100.

Intercollegiate Land Plane Race, May 24th—Princeton, Lieutenant Jack Frost, first prize, $250; Pennsylvania, Lieutenant C. H. Payne, second prize, $150; Columbia, Lieutenant Floyd Gahman, $100; Yale, Ensign A. A. Beckwith, $50.

Boston Globe Trophy—Captain Mansell R. James, R. A. F., first prize, $1,000; M. W. Hodgdon, Boston, second prize, $500; Frank H. Stanton, Princeton, third prize, $250.

Herald Efficiency Prizes—Captain Mansell R. James, R. A. F., first prize, $1,000 (Class B, aeroplane with more than 100 horsepower); A. Livingstone Allen, second prize, $250 (Class A, under 100 horsepower).

Aerial Commuting—Greatest Total Distance During Month—Frank H. Stanton, Princeton, 920 miles; Robert Shank, Atlantic City, 796 miles; A. L. Allen, New York, 236 miles.

Greatest Number of Trips—Frank H. Stanton, Princeton, 6 trips; Robert Shank, Atlantic City, 5 trips; A. L. Allen, New York, 1 trip.

Longest Flights—Captain Mansell R. James, R. A. F., 340 miles; Frank H. Stanton, Princeton, 340 miles; A. L. Allen, New York, 340 miles.

Note—Where the same distance was covered the awards were based on the time. The prizes awarded were the Second Pan-American gold, silver and bronze medals.

Pulitzer Trophy, Valued at $5,000—Captain M. R. James, R. A. F., Atlantic City to Boston; elapsed time, 4 hours, one stop of 40 minutes at Mitchell Field, L. I.; run made May 26th.

Parachute Contest—$500 Bennett Prize—Lieutenant Jean Ors, three trials, two by Werner Genet from 350 and 1,000 foot levels; W. L. Watkins, three trials, jumps by George Weiss, same altitudes; Lawrence Sperry, two trials, jumps by F. Godwin from 1,000 foot levels. Decision on winner deferred pending compilation of records.

Urge Adoption of Medical Standards

The adoption of International Medical Standards for the classification of those who want to fly was urged in a report rendered to the Second Pan-American Aeronautic Convention by the Special Committee on Air Medical Standards.

The report discloses the fact that recommendations were made for International Air Medical Standards two months ago by the Joint Committee on Air Medical Standards of the Pan-American Convention and sent to the Inter-Allied Aeronautic Commission in Paris, which is forming the rules and regulations to govern international aerial navigation.

The report presented points out that while a great majority of people can fly to heights of over 15,000 feet, there are a sufficient number of people who cannot fly to heights above 10,000 feet to make it necessary to classify flying aspirants in accordance to the heights to which they can fly.

The work of classifying people in accordance to the altitude level to which they can fly must be done by specialists who are the equivalent of the "flight surgeons" which were created in the U. S. Air Medical Service of the United States Army eighteen months ago, and save hundreds of lives of Army aviation students as well as aviators at the front.

The need of "flight surgeons" to deal with the medical aspects of civilians as well as military aviators was emphasized in the report rendered by the committee. The report disclosed for the first time, how the Air Medical Service classified 30,000 Army aviators according to the heights to which they could fly, and how "flight surgeons" kept the aviators in good physical conditions throughout the war. The report urges the establishing of "flight surgeons" as a permanent body of experts to look after the civilian aviators, pointing out that the "flight surgeon" is entirely an American institution created in the beginning of 1918.

The report gives credit for the good work performed to Brigadier-General Theodore C. Lyster, U. S. Medical Service; Lieut. Colonel Isaac H. Jones, Colonel George H. Crabtree, Colonel Eugene R. Lewis, Colonel Nelson Capen and Mr. Walter Camp. For this pioneer work General Lyster was awarded the Distinguished Service Medal.

Aeronautic Maps

"The map of the future is the air mosaic," declared Lieutenant M. C. Lawrence, R.M.A., A.S.A., speaking before the convention. "Whether it be the military map, the automobile road map or a map of the air routes, the only absolutely accurate information of the terrain, the roads, the elevation of the towns, cities and all topographic features, is the minute mosaic—the map produced by dovetailing pictures snapped from the aeroplane of any given territory. The Government, realizing the value of these records of the country, has already started to employ the aviators still in the training camps of the West in making of a map that is expected to cover every inch of territory in the United States.

"The making of this map is a stupendous undertaking and will probably require years of hard work and application, but its military and commercial value once it is completed will be unlimited.

"It has been said that the eye, the sextant, planes and all other mechanical measuring devices can be fooled, but the sensitive vision of the isochromatic plate cannot be fooled. Photography played a most important part in the war. The observer was easily misled by camouflage of the enemy, but to date there has never been perfected a camouflage that can fool the eye of the camera. Gun emplacements most carefully concealed were readily revealed on the plates of the camera. Every slight change in the ground was depicted by the camera, and now the work of picturing every bit of this country has really been started by the Government, and

(*Continued on page* 650)



The News of the Week



$25,000 Offered for New York-Paris Flight

A prize of $25,000 has been offered by Raymond Orteig for the first non-stop aeroplane flight between New York and Paris, a distance of about 3,600 miles. That distance has never been flown by an aeroplane without stopping.

Mr. Orteig is proprietor of the Hotels Brevoort and Lafayette. He said to-day that he was led to take an interest in flying by talking with American and French airmen, who have visited him at the Brevoort.

"These men believe that the next five years will bring great development in the aeroplane," said Mr. Orteig. "It was their enthusiasm that converted me. Then I was seized with the idea of combining sport with the art of flying. I was born in France, you see, and I have lived in this country since 1882. So I decided that a New York-Paris flight would be a big thing, both toward the future of aviation and to further unite the two great nations.

"My only stipulation was that the airmen making the flight must be of allied nationality. The other details will be announced as soon as I have them. The Aero Club of American is preparing a set of rules for my approval concerning the conditions under which the flight must be made. The start may be made from either side."

U. S. to Get 1,600 Foreign Planes

Washington, D. C., May 30.—One thousand Nieuport and 600 Spad aeroplanes, and 1,000 Hispano-Suiza and 800 Gnome motors will be shipped to the United States under the terms of an agreement between the French Government and the United States Liquidation Commission.

The planes and motors represent a part of the aviation equipment contracts for abroad by the War Department.

Recommendation to Abandon Naval Program Not to Apply to Aircraft

Washington, D. C.—Although Secretary of the Navy Daniels has recommended the abandonment of the naval three-year building program in order to demonstrate confidence in the League of Nations, he urges the granting of the $45,000,000 appropriation for aviation. "If this appropriation is made," he said, "we intend to spend very little in stations The entire amount, so far as practicable, will be used in experiments. We wish more planes for our ships to be used in fleet manoeuvres. They are absolutely necessary to effective manoeuvres."

St. Petersburg to Havana in 5 Hours 20 Minutes

Havana, Cuba.—Flying a Curtiss F boat, Johnny Green made a flight from St. Petersburg, Fla., to Havana, Cuba, a distance of 381 miles, in 5 hours and 20 minutes, averaging over 70 miles an hour. This is the first commercial flight between Cuba and America.

First Woman Makes Air Journey From Washington

The first woman to make the air journey from Washington to New York, the Army Air Service announced, is Mrs. E. E. Harmon, wife of an army lieutenant, who left Washington at 11.10 A. M. to-day and arrived at Hazelhurst Field two hours and forty-five minutes later. Her husband piloted the machine, a military bombing plane, and Colonel Robert E. O'Brien, Colonel William C. Sherman and Major Raycroft Walsh were other passengers.

Cuba Thanks U. S. Air Service for Instructors

Washington, D. C., June 2.—A letter was received from the Cuban Minister through the Office of the Secretary of State by the Office of the Secretary of War which expresses the appreciation of Cuba of Kelly Field and School of Military Aeronautics, Austin, Tex., for the efficiency, devotion and the interest manifested by the corps of instructors of the School of Military Aeronautics of Austin, Tex., and of the United States Aviation School, Kelly Field, San Antonio, in the training of the group of aviators and machinists of the Aviation Corps of the Cuban Army, who were sent to those schools for their instruction.

To Preach From Pulpit 2,000 Feet Up in Air

The first sermon from the air, preached by a "sky pilot" of the Methodist Church, will be a headliner at the Methodist Centenary Exposition, to be held at Columbus, Ohio, June 20 to July 14, according to plans announced.

According to the exposition's press agent the aerial sermon will be preached by a minister who will float above the heads of his congregation at a height of 2,000 feet or so. His message will be audible to all by means of a wireless telephone and a megaphone attachment.

Aerial Police Patrol Proposed for Detroit

Detroit, Mich.—Control of air traffic in Detroit by a flying patrol is classed by the police commissioner as not only a possibility but a probability. The commissioner expressed himself strongly in favor of an auxiliary to the police department for aerial work and an effort will be made at once to interest prominent Detroiters in the matter of purchasing aeroplanes for the police department.

Aero Club of Columbia Will Purchase Landing Field

New York, N. Y.—Lieut. E. L. Smith, president of the Aero Club of Columbia, announced that the organization will soon be flying its own planes on its own field in the near future. Contributions for the purchase of planes and gifts of equipment have been generously given. A. Monell, director of the International Nickel Corporation, and J. P. Grace of W. R. Grace, with contributions of $1,000 and $500, respectively, being among the recent donors.

The club has 24 flying members, some of whom have seen service overseas. Conspicuous among these are George De Forrest Larner, American ace; Lieut. M. D. Lowenstein, who was attached to the 49th Bombing Squadron, and Lieut. A. K. Doolittle.

Dean George B. Pegram said recently that he is looking forward to the time when courses in aeronautics will be established as part of the curriculum of the School of Engineering.

End 3,300-Mile Flight From Texas to Pacific

Washington, May 27.—The War Department was notified to-day that the Ellington Field "Gulf-to-Pacific" squadron



Lieut. Ormer Locklear, the Aerial Acrobat, Performing for the Benefit of the Crowds at Atlantic City's Airport

of DeHaviland Four planes has just returned home after a remarkable cross-country flight of 3,300 miles from Texas to the Pacific Coast and return.

This squadron, under command of First Lieut. R. O. Searle, charted unknown territory, skimmed the waters of the Gulf of Mexico, darted over the backbone of the continent at a height of 16,000 feet, tasted salt water at San Diego, and has even flown 600 feet underground.

Accompanying Lieut. Searle on the flight were Lieuts. E. D. Jones, Rick Nelson, Charles Rugh, Howard Birkett and E. L. Bilheimer, Sergeant W. E. Cain and Louis Lewyn, a motion picture photographer.

The actual flying time for the 3,300 miles traversed was 1,940 minutes. This is an average speed of about 101 miles an hour.

Remarkable spurts of speed were made at times. On the way from Kingman, Ariz., to Tucson, Ariz., flying at an altitude of 14,000 feet, Lieuts. Eearle and Jones passed over Phoenix, Ariz., which is 167 miles distant from Kingman, in exactly one hour after they had left the latter place.

The trip from San Diego to Los Angeles, a distance of 134 miles, was accomplished in fifty-six minutes, an average speed of about 140 miles an hour.

Lieuts. Searle and Jones made the first trip ever attempted across the Grand Canyon in an aeroplane. They crossed the big chasm at the junction of Diamond Creek and the Colorado River Canon, which, at this point, is about 2,000 feet across, with a sheer drop of 7,000 feet. They flew at an altitude of 13,000 feet, and were bothered by terrific bumps and cross currents of air. The ship was knocked around and buffeted so that it was hard to control it.

Lieut. Rugh and Lewyn, the motion-picture man, actually flew down into the canyon. They got down to 600 feet below the edge of the canyon.

First Flight Into Yosemite Valley Made

Yosemite, Cal., May 27.—The first aeroplane flight into Yosemite Valley was accomplished on May 27 by First Lieutenant James Stephen Krull, flight commander at Mather Field, flying from Merced, Cal.

Rising to an altitude of 11,000 feet, Lieutenant Krull completed the eighty-mile flight into the heart of the Sierra Nevada Mountains in one hour and five minutes.

Oil Companies Use Aeroplanes to Deliver Pay Rolls

Several Texas oil companies have adopted aerial delivery for their pay-rolls, the increase of speed and the safety from possibility of hold-up being among the considerations that led to the adoption of aeroplane delivery.

Bernard H. Baker, Mayor of South St. Paul, Minn., reports the successful use of an aeroplane in campaigning for office.

A Brooklyn physician has purchased an aeroplane to use in flying from his home to Lake George, where his summer bungalow is located.

Sioux City to Establish Landing Field

Sioux City, Ia.—The Sioux City Chamber of Commerce and the local Press Club are conducting a campaign for the establishment of a local landing field.

Impetus to the movement was given by a visit of Captain Eddie Rickenbacker and an elaborate banquet tendered by the Press Club of Sioux City. It was at Sioux City Speedway that Captain Rickenbacker in 1914 won his greatest dirt track race.

Underground Dirigible Hangar to Reduce Construction Expense

As a solution of the difficulty of constructing dirigible hangars suitable for housing eight or more dirigibles and permitting launching under the most favorable conditions regardless of wind direction, a writer in a German publication suggests the use of a large circular trench. A light metal roof having doors is to be operated by a motor so that any airship, particularly the one most favorably located as to wind direction, may be launched. The cost of construction of a hangar system of this type is said to be lower than for buildings where the high strength required on account of wind, coupled with difficulties of launching encountered in adverse winds are serious disadvantages.

Admiral Peary, Explorer and the President of Aerial League of America, Elected to Board of Managers, National Geographical Society

Washington, D. C., June 2.—Rear Admiral Robert E. Peary, U. S. N., retired, Arctic explorer and discoverer of the North Pole, president Aerial League of America and member of the Board of Governors of the Aero Club of America, was elected to be a member of the Board of Managers of the National Geographic Society to succeed the late Brig. General John M. Wilson, U. S. A., who died recently.

San Francisco-Los Angeles Passenger Service Planned

San Francisco, Cal., May 28.—Plans for the development of aero routes on the Pacific Coast were given out by the Pacific Aero Club at its annual meeting in this city, these plans including a cross-continent flight from San Francisco to New York, and a mail and passenger route between San Francisco and Los Angeles.

A private company is just completing plans for the aero passenger service between San Francisco and Los Angeles, according to Frederick Porter, first vice-president of the Pacific Aero Club, and assurances have been given that the government will co-operate with the private undertaking in establishing an air mail service between these two points.

The types of planes to be used in the mail and passenger service will be the Glenn-Martin bombers, equipped with two 400-horsepower Liberty motors, which will carry 10 passengers, and Handley Page machines which carry 20 passengers. Passengers' compartments on these machines will be completely inclosed. Landing stations for this service have already been purchased or leased at Stockton, Fresno, and Bakersfield, by the Pacific Aero Club.

Aviation Will Be Discussed at Commercial Conference

Washington, May 31.—Aviation as an aid to Pan-American commerce will be one of the features on the program of the Second Pan-American Commercial Conference to be held here June 3 to 6. The possibility of this latest method of transportation in the development of trade between the United States and Latin America, is one of the topics whih will be discussed by the commercial experts who will be present at the gathering. Plans are being considered for a special exhibition flight over the Washington Monument grounds adjoining the Pan-American Building for the benefit of the conference on the day aviation transportation is under discussion. Shipping and transportation, financing trade and the future of Latin American investments, loans and bonds, trading methods for exports and imports, parcel post, patents and trade marks, trade and travel regulations, engineering, educational aids to commerce, these and other phases of commercial intercourse will be taken up by experts in the various lines. Telegrams have been sent by Director General Barrett of the Pan-American Union to the Governors requesting them to send representatives who will report back to the business interests of the States on the possibilities of future trade relations with Latin America. The United States and every other republic of North and South America will be represented at the conference.



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Capt. J. Alcock, D. S. C. (in civilian attire), the pilot of the Vickers-Vimy Biplane, which will soon attempt the Trans-Atlantic flight, and Lieut. Arthur Whitten Brown, who will act as navigator

DEPARTMENT STORE INAUGURATES AEROPLANE DELIVERY SERVICE



DOES Newark know how? Apparently it does.

The first regular aerial "store to customer" delivery service in the country was inaugurated May 25 between L. S. Plaut & Co. and Asbury Park.

The plane, specially designed and constructed by the Witteman-Lewis Aircraft Co., which was piloted by Lieutenant Paul Micelli, who was accompanied by Lieutenant Louis Goldberg, both of whom had formerly been in the United States Army Serice as pilots and instructors, made the flight between Newark and Asbury Park in approximately 25 minutes, flying time.

Starting from the aviation field on Lincoln Highway, the plane first flew over the central part of Newark, making several manœuvres over and around Plaut's, very much to the admiration of thousands of spectators who crowded the streets below. The plane then set a straight course for Asbury and in spite of the rain-storm that had set in and low hanging clouds which obscured the pilot's vision, made a wonderful trip to Asbury, landing on the aviation field there in perfect order. Plaut's auto trucks were awaiting the arrival of the plane and within a few minutes the merchandise was transferred to the trucks and the mail bag was delivered to the Asbury Park Post Office within six minutes of the plane's arrival.

The plane carried in addition to its customers' parcels, a mail bag and the two pilots. The pilots were sworn in at the Newark Post Office as postal messengers so as to give them legal status to carry the mail from Newark to Asbury. This is the first time in history that a commercial organization was authorized by the Post Office Department to carry mail, which is an unusual honor and compliment paid to the Plaut Co., and evidence of the great interest taken by the Government in aeronautical developments.

A letter from Mayor Gillen to Mayor Clarence E. F. Hettrick of Asbury Park, carried in the mail bag, follows:

The aviator who will deliver this letter to you will bring you greetings from the people of Newark.

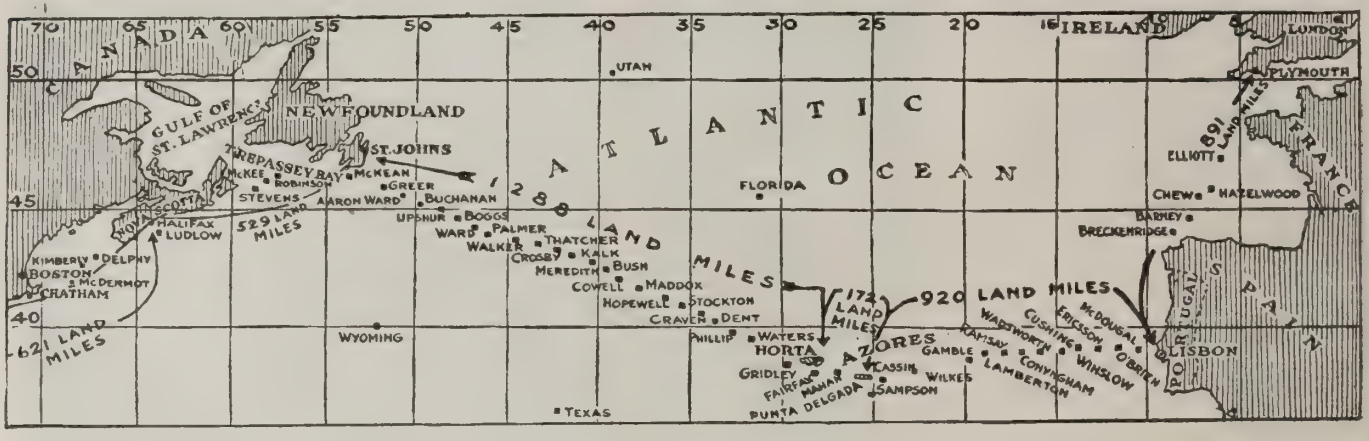
As I understand it, for the first time in the history of the world an aerial delivery service for the transportation of merchandise is established. The aeroplane which carries our greetings to you will hereafter transport daily merchandise for the progressive and enterprising business house of L. S. Plaut & Co. of this city, between Newark and Asbury Park.

This is a remarkable advancement in aerial navigation. Our respective municipalities are to be congratulated for taking such a foremost position in the field of progress.

Mr. Chester A. Brown, advertising manager of the L. S. Plaut Company, with Julius M. Meirick, a promoter of commercial aviation, had full charge of arrangements for the flight. They will announce a regular schedule in the near future, Mr. Meirick declared.



Personnel of L. S. Plaut & Co., and Wittemann-Lewis Aircraft Co., who co-operated in establishing the first store-to-customer department store aerial delivery



THE TRANS-ATLANTIC FLIGHT SUCCESSFULLY COMPLETED

WHEN Lieutenant-Commander Read brought the American seaplane NC-4 to her anchorage in Lisbon harbor he had achieved the triumph every flying man of every nation had dreamed of—passage between the New World and the Old World by an aircraft. Germans had planned such a trip in their mighty Zeppelins; Hawker and Grieve had boldly challenged the perils of an unescorted dash; French aviators had laid their plans for a well-considered attempt to the south. It was on May 27 that Read and his crew won the imperishable fame their victory over mechanical difficulties, the elements and the weakness of the human organism confers on them.

But theirs was no adventure of sportsmanship. They were under orders in the naval service of their country, and their goal was not merely the coast of Europe. They were instructed to fly by a definite route to a particular objective. Had they not reached that objective their trip would destination of the seaplane flight. But no other spot could have been more appropriate have been unsuccessful from the official point of view. Consequently their labors did not cease until their craft came to rest in the English harbor of Plymouth.

As the Navy is not sentimental in the ordering of its cruises, practical reasons dictated the selection of Plymouth as the ate for the ultimate landing place of a pioneer transatlantic airship sailing from the United States. From Plymouth the Mayflower Pilgrims departed September 6, 1620, to make their homes in the New World, to found "a church without a bishop, a state without a king."

The conquering of the air in the flight over the Atlantic was only one of the problems the Navy set out to solve when it began the experiments that brought forth the NC flying boats. The situation produced by Germany's submarine war made it desirable that a new method of combating U-boats should be devised. Our naval authorities looked to the development of the aeroplane to provide it. Their intention was to produce a machine capable of crossing the ocean in the air, of alighting on the water and making progress as a boat, of rising from the sea. The performances of the three seaplanes that departed from Rockaway May 8 have justified the design that was adopted. The NC-4 was able to overcome mechanical difficulties and complete her trip; Commander Towers's flying boat, after being forced to the water, carried its crew in safety to Ponta Delgada; and Lieutenant-Commander Bellinger and his crew were saved when their boat was compelled to quit the air. From the mishaps of these aviator-sailors, no less than from the experiences of the NC-4 and her complement of men, the Navy Air Service will learn wherein the plans and specifications of the NC class should be modified. Thus all have contributed to the future of the art of flying.

Mastery of the air will belong to America if the United States will exert itself to hold and maintain it. The new profession of flying is American by virtue of the discoveries and application of scientific principles made in this country.



The NC-4 the first aircraft to successfully cross the Atlantic



Crew of the successful NC-4, from left to right: Lieut. Commander A. C. Read, commander; Lieut. E. F. Stone, pilot; Lieut (j g) Walter Hinton, pilot; Ensign Rodd, radio operator; Chief Special Mechanic E. H. Howard, engineer; Lieut. J. L. Breese, reserve pilot engineer

Our leadership was lost to us by our own lethargy and indifference. Read and his fellows, the opportunity having been given to them by an awakened officialdom, have restored it to us.

The last "hop" of the American Navy's ocean-spanning plane, the NC-4, was completed May 31, when Lieutenant-Commander Albert Cushing Read flew the giant machine into the harbor of Plymouth, England. This last leg of the long-dreamed-of transatlantic flight was from Ferrol, Spain, and was accomplished without untoward incident, the flight requiring just one minute less than seven hours.

Secretary Daniels announced that no further instructions had been sent as to the movements of Commander Read and his crew. The question as to whether the historic plane will be flown back to the United States by a more direct route or knocked down and shipped back, has been decided by circumstance. The flight across was planned on the known fact that except for about four days a year the wind would be in the direction of the flight and the engines of the big plane were designed for seventy hours' continuous service. The terrific strain to which they have been subjected since this one successful unit of the fleet of three flying boats left Rockaway and the fact that a head wind of at least ten miles an hour would have to be fought against all the way back, will make it necessary to ship the flying boat back to the United States.

Immediately upon receipt of the news of Read's successful landing Secretary Daniels sent the following message to the naval aviator:

"All the people of America are happy over your successful flight, which has been an epoch making event in the history of the world. My congratulations and greetings and good wishes."

Receipt also was announced of the following message through Rear Admiral Knapp from the British Admiralty:

"This morning's news brings the epoch making intelligence that the space between America and Europe has now been successfully spanned by air by way of the Azores. It is with great pleasure that their lordships have heard of this success and they desire me to offer their congratulations to the crew of the seaplane NC-4 and to the United States Naval Air Service on the fine achievement."

Flew 4,514 Miles

The hop to England from Portugal came really as an anti-climax. Read's great feat had been accomplished when he brought his giant plane to rest in the harbor of Lisbon. The bridging of the Atlantic by air was then an accomplished fact and the 775-mile flight to Plymouth was taken for granted as certain of accomplishment from the moment the success of the transocean flight was flashed back to America.



Crew of the N.C-1 from left to right: Lieutenant-Commander P. N. L. Bellinger, commander; Lieut.-Commander M. A. Mitscher, pilot; Lieut. J. T. Barin, pilot; Lieut (j. g.) Harry Sodenwater, radio operator; Chief Machinist's Mate, C. I. Kessler, engineer; Machinist Rasmus Christensen, reserve pilot engineer

In this last leap in the long flight the troubles which have followed Read and the NC-4 since the beginning of the flight cropped up again. He was forced to bring his plane down twice, the last time at Ferrol, Spain, in order to complete the scheduled trip to Plymouth.

From first to last the NC-4 has been taken 4,514 miles—ordinary land miles—or 3,923 knots or nautical miles, on the following schedule:

Schedule of NC-4's Eventful Flight From Rockaway

Course.	Date.	Distance, Knots.	Time.	Speed, Knots.
Rockaway-Chatham, (forced landing about 100 miles off Chatham)	May 8	300	5:45	52
Chatham-Halifax	May 14	320	3:51	85
Halifax-Trepassey	May 15	460	6:20	72.6
Trepassey-Horta	May 16-17	1,200	15:18	78.4
Horta-Ponta Delgada	May 20	150	1:45	86.7
Ponta Delgada-Lisbon	May 27	800	9:44	82.1
Lisbon - Mondego River	May 30	100	2:07	48.8
Mondego River-Ferrol	May 30	220	4:37	45.6
Ferrol-Plymouth	May 31	455	6:59	64.8



The crew of the NC-3 from left to right: Lieut.-Commander John H. Towers, commander; Lieut.-Commander H. C. Richardson, pilot, Lieut. David McCullough, pilot; Lieut-Commander H. A. Lavender, radio operator; Machinist, L. R. Moore, engineer; Lieut. (j. g.) Braxton Rhodes, reserve pilot engineer



© International Film The NC-4 arriving at the Azores, after successfully flying the longest span of the Trans-Atlantic journey

The flight across the Atlantic from Newfoundland to Lisbon, a distance of 2,150 nautical or 2,472 land miles, was made by the NC-4 at the rate of 80 knots, or 92 miles per hour. This is far in excess of the cruising speed of 63 knots, announced at the start of the flight.

When the NC-4 reached Plymouth, her destination, she had traveled a distance of 3,925 nautical, or 4,514 land miles.

Commander A. C. Read belongs to the second group, in point of time, in the development of Annapolis graduates in aviation. To the first group belonged Towers, Richardson, and Bellinger. The pioneers became pilots through individual training. Read is a member of the first aviation class of the navy, that of 1914. He had been graduated at the Naval Academy earlier, near the top of his class, and his ability advanced him rapidly in aviation. He not only won a place as one of the best pilots, but also as an administrator in the aviation division.

Commander Read was born in New Hampshire in 1887, and appointed a midshipman from Massachusetts in 1903. He is married and has one child, a boy. He is a small man, quiet and observing.

There is perhaps no naval aviation officer who has put more conscientious study and effort into flying than has Lieutenant Commander Read. He has devoted his time to it since 1915, and in these four years has proved his worth as a pilot and as an administrator.



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Lieut.-Commander A. C. Read, who will go down in history as the first air pilot to successfully trans-navigate the Atlantic

His first sea service after he was graduated was on board the battle ships Massachusetts, Indiana and Arkansas. In November, 1908, he was ordered to report for duty to the commander of the Third Squadron, Pacific fleet, and was assigned to duty on board the destroyer Decatur. He was ordered home in August, 1911, and left Nagasaki harbor on September 11. Two days later he was promoted to the rank of lieutenant, junior grade. He was made a lieutenant, senior grade, on July 1, 1913.

After he reached home he was assigned to duty at the torpedo station at Newport. From this post he was sent to Pensacola to study flying. He remained there a year and then was ordered to duty aboard the cruiser North Carolina and later to the Washington. On June 5, 1917, he was detached from sea duty and sent to the aviation station at Bay Shore, L. I., of which he became commander.

Lieutenant Commander Read has a wife and child. He married Miss Bessie Burdinie, of Miami, Fla., on January 31, 1918.

First Lieutenant Elmer F. Stone, pilot and constructor, belongs to the United States Coast Guard, and is one of the oldest fliers in that organization. His skill and daring when the war placed a greater pressure on the Navy led to his transfer to the Bureau of Construction and Repair as a test pilot for new machines, and the record he made won him a place in the transatlantic list. Lieutenant Stone was born in New York in 1887, and appointed to the United States Coast Guard Academy from Norfolk, Va., from which he was graduated in 1910.

Lieutenant Walter Hinton, pilot, was an enlisted man who became an ensign in March, 1918, and on account of his skill as an aviator was designated as one of the pilots of the flying boat H-16 in its flight from Rockaway Beach to Hampton Roads last January. Hinton was born in Ohio and is 31 years old.

Ensign Herbert C. Rodd, radio officer for No. 4, assisted in the development of the radio compass used on the three seaplanes. Before he joined the United States Naval reserves in August, 1918, Ensign Rodd served as radio operator on the Great Lakes. He was born in Cleveland, Ohio, in 1894.



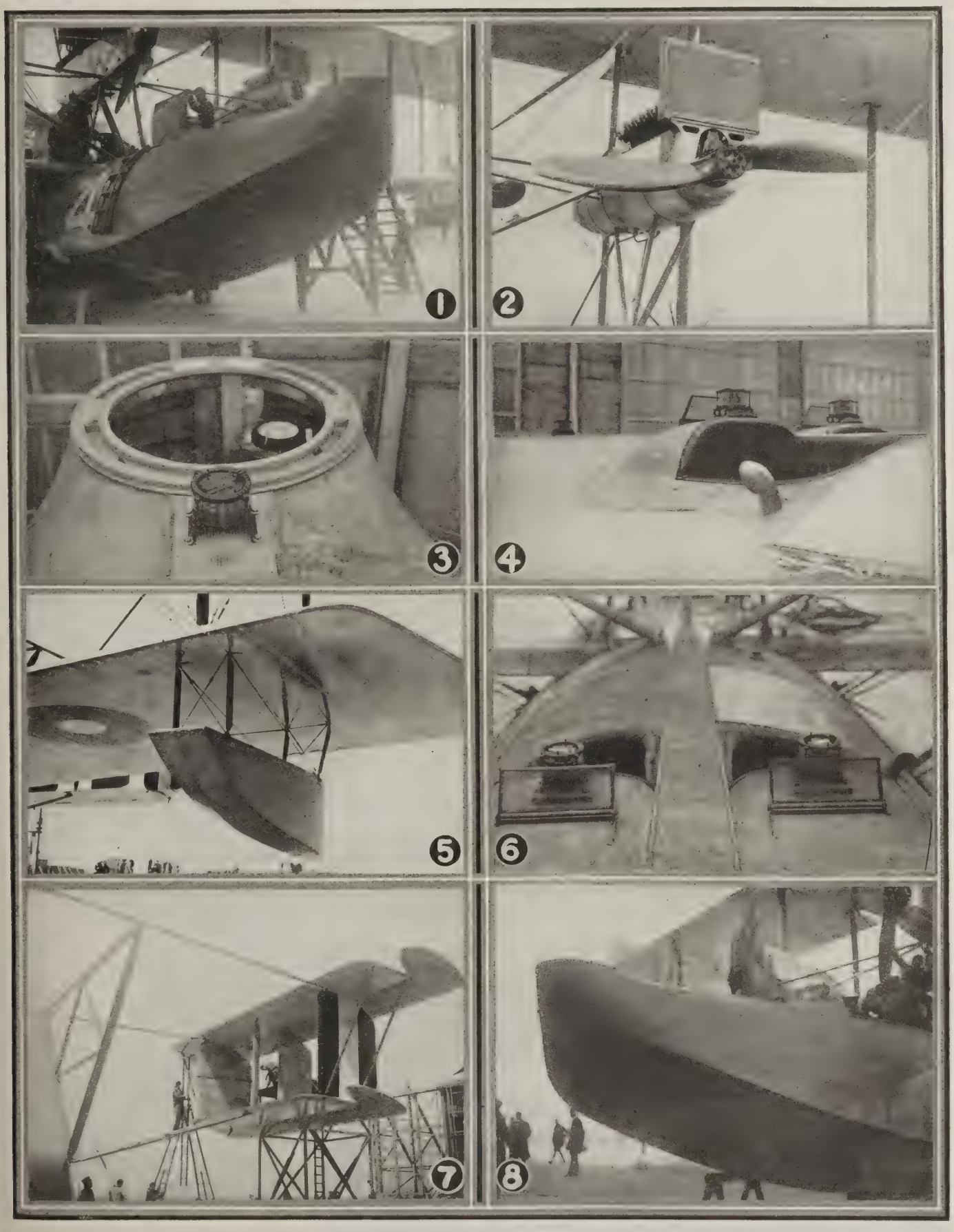
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Admiral D. W. Taylor whose enthusiasm was largely responsible for the Trans-Atlantic flight of the U. S. Navy flying boats



Photo by Paul Thompson

Commander C. G. Westervelt, who had charge of NC plane construction



DETAILED VIEWS OF NC-4 FLYING BOAT

1—Forward part of hull. The ladder leads to pilots' cockpits.
2—One of the power units, showing streamline engine nacelle.
3—The commander's cockpit at the extreme front of the hull.
4—The pilots' compartments showing special compass installation.
5—Wing tip float under the lower left main plane.
6—Pilots' compartments as seen from the front, showing windshields.
7—The biplane tail group. There are two fins and three rudders.
8—Side view of front of hull, showing placement of the navigator.



The Handley Page biplane, powered with four Rolls-Royce motors, now being assembled at St. Johns for a one-hop Trans-Atlantic flight

Congratulations From Secretary Daniels

Official word of the arrival of the seaplane at Lisbon reached the Navy Department first through a dispatch from Brest, France, sent by Rear Admiral Halstead, commander of the American Naval Forces in French waters. The message was received at the Otter Cliffs, Maine, station and relayed to Washington.

Immediately Secretary Daniels cabled the congratulations of the department to Lieutenant Commander Read. The Secretary also sent a cable message to President Wilson at Paris telling him that American naval aviators had been the first to cross the Atlantic.

The message to Lieutenant Commander Read follows:—

"Lieutenant Commander Albert C. Read,
"Commanding NC-4 seaplane,
"Care Rear-Admiral Plunkett,
"U. S. S. Rochester, Lisbon, Portugal:

"The entire navy congratulates you and your fellow aviators on your epochal flight. The ocean has been spanned through the air and to the American navy goes the honor of making the first transatlantic flight. We are all intensely proud of your achievements and thankful that it has been accomplished without mishap to any one of the daring aviators who left our shores on the first air journey to Europe. To all of them and to you all honor is due.

"JOSEPHUS DANIELS."

The cable message from the Secretary to President Wilson said:—

"Know you will be delighted to learn naval aviators first to cross Atlantic."

Secretary Daniels explained that the first Atlantic trip was the beginning of a series of experiments in long distance flying and that very probably, after defects in naval aircraft brought to light during this flight had been corrected, an other squadron of seaplanes would be headed across the Atlantic. Mr. Daniels said he has not decided whether the NC-4 should attempt to fly back to the United States or be "knocked down" at Plymouth and shipped back to America.



The Vickers "Vimy-Rolls" biplane which is being set up at St. Johns for a Trans-Atlantic attempt

Invaluable Data for Future Flying Gathered

Naval officers who have been in close touch with the American transatlantic flight believe very important practical lessons may be drawn from it which will bring the time when such flights are everyday affairs perceptibly nearer.

In the first place it is learned that they are very well satisfied with the proof of the practicability of navigating aeroplanes by the stars. All three of the American fliers succeeded in keeping on their course to the Azores, and though the chain of destroyers was of advantage as an insurance against accidents, as a matter of fact the planes could have been navigated without their aid.

This, of course, means that transatlantic pilots must have a seaman's training, and even the highly skilled ordinary aviator like Hawker needed a sailor like Grieves to keep him straight.

Secondly, the value of station ships as meteorological observatories has been clearly demonstrated. Up to the present, weather forecasts for the mid-Atlantic have been almost valueless through the lack of means to record storms which do not happen to hit any of the regular land stations.

The experience of this flight shows that this difficulty could easily be surmounted by having a very few vessels cruising in definite areas and sending regular reports to a meteorological headquarters ashore.

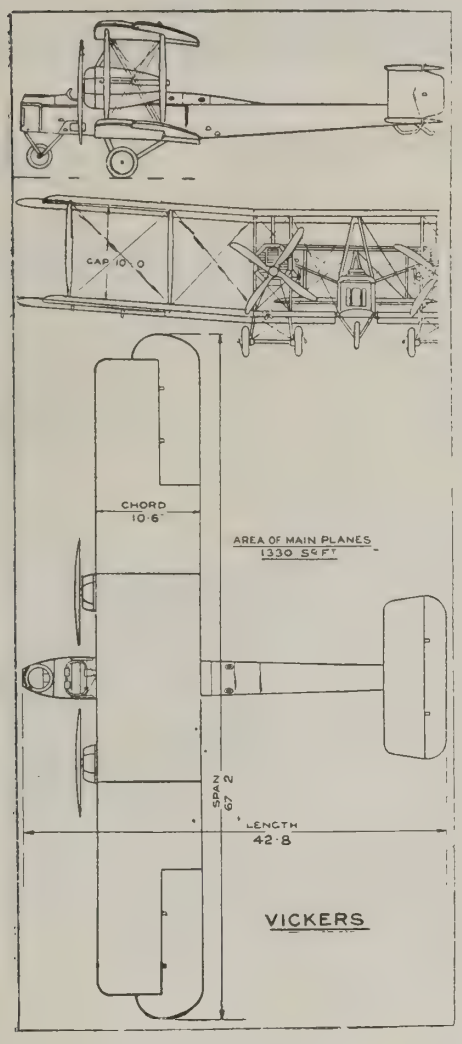
Third, much gratification is expressed at the way the planes that came down stood their Atlantic buffeting. Commander Towers's NC-3 rode out waves thirty feet high, and although he could not make a rising, stood the test all right.

Certain modifications will be made as the result of his experience, and it is confidently hoped that much more seaworthy planes soon will be evolved.

Finally, it is evident that still larger planes must be developed in order to carry bigger stocks of gasoline so as to provide a greater margin of fuel.

When the fog difficulty was suggested to a naval authority he replied that it could be overcome by the development of direction finding by radio which has already been worked out for large craft, but is not yet sufficiently perfected for so small a vessel as an aeroplane.

It is also pointed out that, quite apart from the safeguards they provided for the crews of the naval fliers, the destroy-



ers played a very important part in the great experiment. It has been possible, by their means, to test the value of a number of different kinds of wireless equipment, and many useful results will be gathered from their experience.

The Vickers Entry

The Vickers craft is being assembled at St. John's on the field at Mount Pearl, where Hawker and Grieve took off. It carries two standard Rolls-Royce engines of 350 horsepower each. The gasolene tanks have been increased to make a capacity of 865 gallons. This, in the opinion of Captain J. Alcock, her pilot, will permit the Vickers-Vimy to fly 2,440 miles without alighting. While the maximum speed is more than 100 miles an hour the engines have been throttled down to an average speed of ninety miles for the overseas flight.

The wing span of the Vickers-Vimy is only 67 feet from tip to tip. Nevertheless it is a sturdy craft, huge in construction. Its body is 42 feet 8 inches in length. The wings are 10 feet 6 inches in width.

A wireless set is being installed as part of the finding apparatus. Its range both for receiving and sending is about 250 miles.

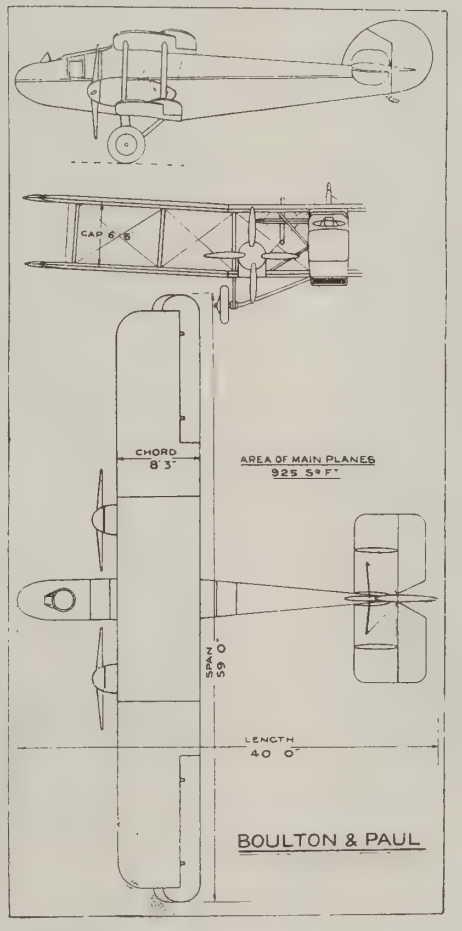
Captain Alcock, the pilot, was born in Manchester in 1892 and received his technical training at the Empress Motor Works in Manchester. He became interested in aviation in its early days, and has been a pilot since 1912. In the famous London to Manchester race in 1913 he won second place.

He became an instructor in the Naval Flying Corps at the outbreak of the war, and later was chief instructor of Britain's "acrobatic squadron." As commander of a bombing squadron in long-distance raids over Turkey he won the Distinguished Service Order.

One night he was compelled to land on enemy soil owing to engine trouble, and was taken prisoner by the Turks. He remained a prisoner until the end of the war.

Lieut. Arthur W. Brown, navigator of the Vickers craft, was born in Glasgow in 1886. His parents were Americans. He received his technical training with the British Westinghouse Company, and due to his expert knowledge of surveying became a specialist in aerial navigation.

He served with the Second Battalion of the Manchester Regiment in France in the early days of the war and later became



an observer in the Royal Flying Corps. He was also taken prisoner over the western front in 1915, and remained interned in Switzerland until the end of the war.

The Handley Page Entry

Like the Vickers machine, the Handley Page bomber was intended for bombing Berlin. She could then carry 1,190 gallons of gasolene, a 200 pound wireless set, 6,640 pounds of bombs, twelve machine guns weighing 557 pounds and a crew of seven men.

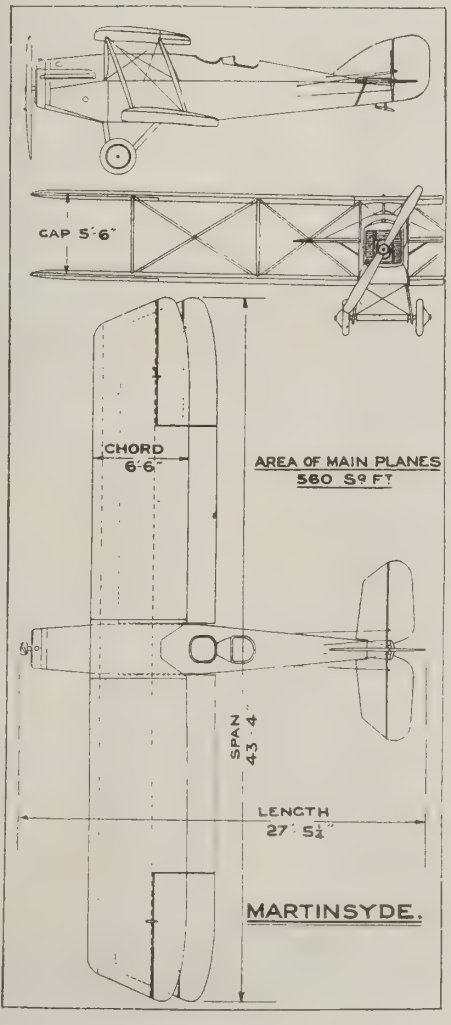
She made 90 miles an hour on her test flight with this load. The machine is being slightly changed, however. Her gas capacity will be about 2,366 gallons, giving her a possible flight duration of 22 hours without stopping. This would give her approximately three hours' leeway in making the Irish coast, with ordinary weather conditions and no adverse winds.

The transatlantic crew will consist of four men, pilot, navigator, wireless operator and observation officer. The pilot will be Major H. G. Brackley, D. S. O., D. S. C. He is 24 years old, and when the war broke out was a student just beginning the journalistic course maintained by Reuters, the great English news syndicate. He volunteered for the war and reecived his pilot's certificate in 1915. He had his first flying in the Shortt machine, and participated in the first night bombing of Bruges and Zeebrugge. He received his Distinguished Service Order for his services in these raids.

His first command was the Seventh Naval Squadron; he was later assigned to the Fourteenth Army Squadron, and later when the Royal Air Force was organized he was made a squadron commander. Under him he had many Americans, some of them pilots.

His navigator will be Major Tryggve Gran, a Norwegian, 30 years old. While a lieutenant in the Norwegian army he flew from Cruden Bay, Aberdeenshire, to Norway, carrying a copy of the "Daily Mail" to Queen Maud. He was the first pilot to complete successfully the North Sea flight. He served as a ski expert with

(*Continued on page* 650)



NC-4 Hopped Off with



Style 2659, Searchlight Daylo, used by the NC fliers. Vulcanized fibre case; 8½ inches long; built to stand hard service. Gives a brilliant white searchlight beam.



Read's victory was a triumph of courageous skill—flawless p

Uncle Sam put the best he knew in NC-4—every ounce w there to do a definite thing without fail.

They gambled with the gasoline in their fight for lifting pow

eready DAYLO in its Kit





Every Daylo is equipped with the long-lived, bright burning Eveready Tungsten Battery and Eveready Mazda bulb. The Tungsten Battery in this Daylo burns from 8 to 12 hours continuously.

For food they took a chance with the scantiest of rations.
But they took no chances with their light—
ALL THE NC 'PLANES CARRIED DAYLO
—the big, husky Searchlight Daylo that says, "There it is!"

THE RADIO TELEPHONE EQUIPMENT OF THE NC-4

By EDGAR H. FELIX, A., I. R. E.
Formerly Radio Engineer, Signal Corps, U. S. A.

THE radio telephone transmitting set used on the NC-1, NC-3 and NC-4 is known by the type number S.E. 1,100, the letters S.E. indicating it to be a design of the Bureau of Steam Engineering of the Navy Department. This equipment is also standard on the HS-16 flying boats. The development of this advanced transmitter is the work of the Marconi Wireless Telegraph Company of America.

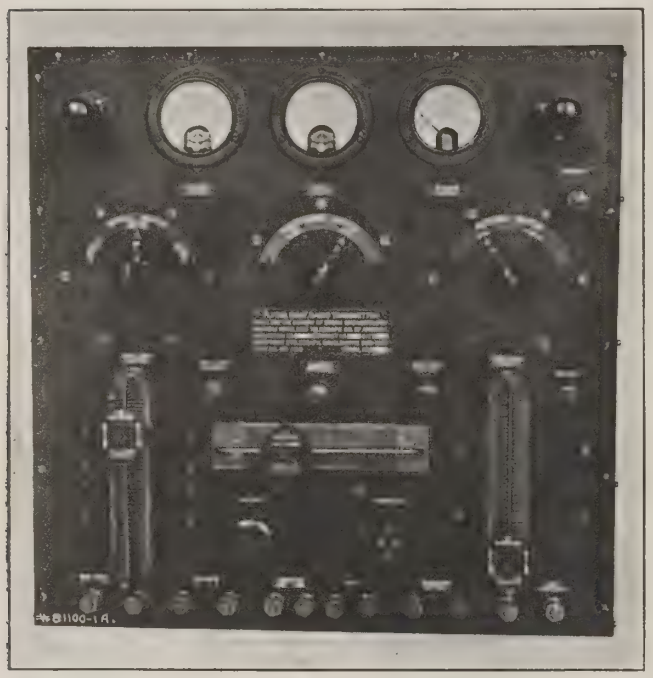


Fig. 1—Front view of the SE 1100 transmitter, showing control switches and rheostats

In preliminary tests off Hampton Roads, this set has transmitted speech over a distance of 150 miles from a seaplane in flight, using a 600-foot trailing antenna radiating a maximum antenna current of 2.5 amperes. In addition to the trailing antenna, the NC boats are also equipped with fixed emergency antennae, stretched above the main planes, to permit transmission while taxying or floating on the surface of the water.

The design of the set permits of transmission of three types:

(1) Voice currents.
(2) Continuous or undamped waves.
(3) Damped waves of audio frequency.

Two wave lengths are used, 1,600 meters being radiated when a trailing antenna 600 feet in length, having a capacity of .0004 microfarads is employed; the other of 600 meters being obtained with the fixed emergency antenna, having a capacity of .00026 microfarads.

Two large pliotron tubes, requiring a filament potential of 18 volts and a plate potential of 1,100 volts are used. One tube is a modulator, which imposes the variations of the voice on the output of the second tube, the oscillator.

The Transmitting Circuit

Following the simplified circuit of the set in Figure 2, we find that the modulating circuit consists of the microphone M, 5-volt battery B and telephone induction coil primary, P_1. By means of the switch, buzzer B may be substituted for the microphone for the transmission of damped waves.

The voice or buzzer modulated current energizes the secondary, S_1 of the telephone induction coil. One end of this coil is connected to the grid of the modulating tube; the other end to the negative side of the filament, through battery B_2 and ammeter A_4. The battery maintains the grid at a negative potential, the critical value of which is obtained by means of a rheostat. When the grid is at negative potential, no flow of current from the grid to the filament is possible.

The potential variations imposed on the grid by the microphone through the transformer are magnified by the modulator tube. The output of this tube is impressed on the oscillator tube, from its plate and negative filament connection to the plate and the negative side of the filament of the oscillator tube, by means of audio frequency transformer L-3. The plates of both tubes are maintained at a potential of 1,100 volts with respect to the filaments by means of 1,500-volt generator G. The choke coil L_4 prevents the radio frequency currents developed by the oscillator tube from flowing back through the generator. Protective condenser C_7 is connected across the brushes of the generator.

In order that a tube may generate continuous waves, it is necessary to couple the grid and plate circuits, either inductively, conductively or electrostatically. The theory of operation of vacuum tubes will not be touched upon here, it having been described in an article by the author appearing in the May 5 issue of this publication.

In this set, the coupling between the grid and plate circuit is obtained inductively through coils L_1 and L_2. The plate circuit consists of plate P, protective condenser C_5, wave length change switch, condenser C_3, which is connected to the negative side of the oscillator filament. The grid circuit consists of grid G, grid condenser C_8, shunted by grid leak R, the grid, by this means being maintained at a negative potential. From the grid condenser, the circuit continues through the wave length changing switch, inductance L_2 and then to the negative side of the filament through condenser C_4.

When it is desired to emit continuous waves, contact K_1 is closed, thus making the circuit regenerative.

The antenna and ground connection is taken off coil L_1, the radiated output being measured by ammeter A_2. Condenser C_2 compensates in the grid circuit for the capacity in the plate circuit due to the antenna and ground.

Operation of Set

Figure 4 shows in greater detail the circuits employed and the arrangement of switches for operation. In order to simplify the diagram, the three main control switches, which may be seen across the center of operating panel in Figure 1, are shown in two parts, the upper and lower portions of the diagram being combined in one switch unit.

There are three positions for the signal switch at the left of the panel. In the first position, continuous waves are emitted. In this position the connections made in the second and third positions are opened. The second position is for telephony; the inside portion of the switch (the upper part in the figure), connects the microphone to the battery, and the

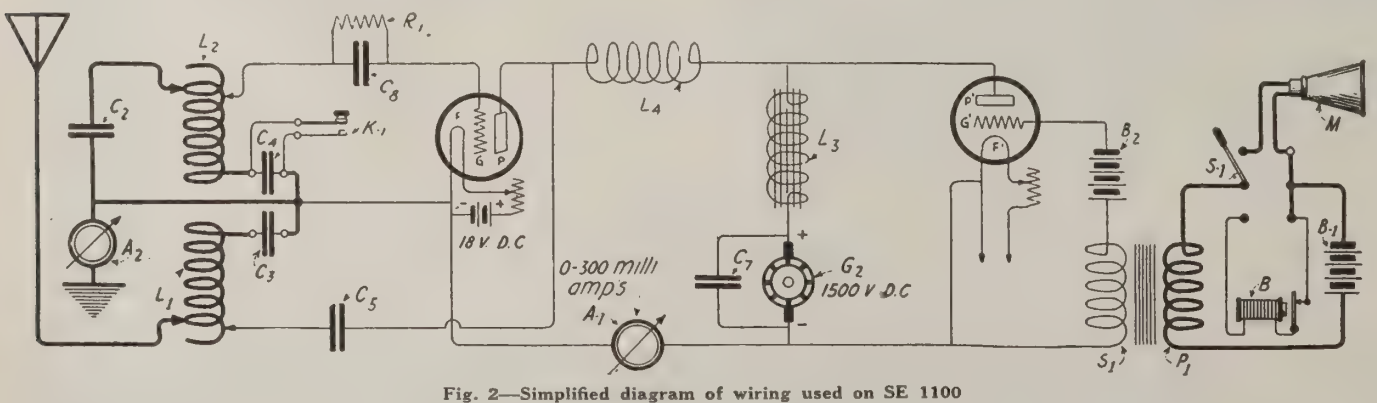


Fig. 2—Simplified diagram of wiring used on SE 1100

outside portion (in the lower part of the figure), completes the filament circuit for the modulating valve and short circuits contact K_1. In the third position of the switches, damped waves are obtained, the buzzer being substituted for the microphone in the connections.

The center switch changes the antenna connections and provides for the two wave lengths, 600 and 1,600 meters.

The antenna switch, at the right of the panel, changes the

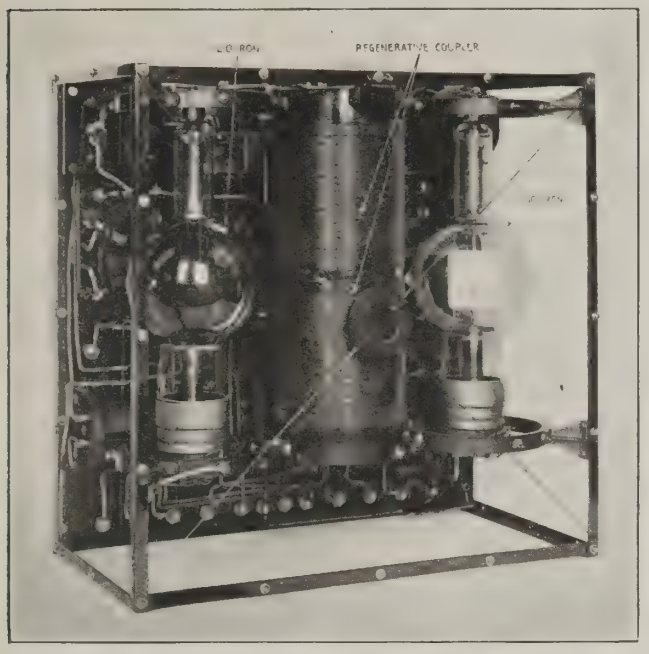


Fig. 3—Rear view of the wireless telephone transmitter showing method of mounting bulbs

set from sending to receiving. At the send position, it completes the 1,100-D.C. supply to the plates of both tubes, and also the connections to the microphone and buzzer.

A direct-current ammeter, A_4 is connected in series with both filaments and reads the total current taken by both of them. The instrument's scale registers from zero to 10 amperes; to read the current in either filament it is merely necessary to cut out the other one. This may be done by means of two small switches marked on the set "oscillator filament" and "modulator filament."

The principal indication for checking up the proper operating conditions of the set is the plate current drawn by each of the tubes from the dynamotor, which is obtained from plate current ammeter A_3, reading from zero to 300 milliamperes.

Three rheostats, mounted on the lower portion of the operating panel control, respectively, the temperature of the oscillator tube filament, the potential of the grid of the modulator tube, and the temperature of the modulator tube.

Constructional Details

The entire set is wired with No. 12 B. & S. gage soft copper wire with empire cloth tubing slipped over it as insulation. No terminal lugs are used; the ends of the wires being in the shape of an eye, which fits the stud terminals and is passed around it in a direction that tends to make the wire grip the stud when the nut is tightened.

The wiring has been so located that small or disturbing capacities between wires are avoided.

Owing to the vibration of the aeroplane, every possible precaution has been taken to prevent the fastenings working loose. Special steel lock washers are used throughout the set. The general scheme of construction is such that the main supports and fastenings will bend before they break, wood or any material which splits or fractures having been eliminated. The steel wire cross braces shown in the illustration make the structure an extremely light and surprisingly rigid unit.

The primary source of energy is two 12-volt, 50-ampere hour batteries. The filaments of the two pliotrons are operated through a rheostat. The 1,500-volt D.C. generator for the plate potential is driven by the 24-volt battery. Three small batteries are required; one for the microphone, another for the negative grid potential and the third for the receiving equipment.

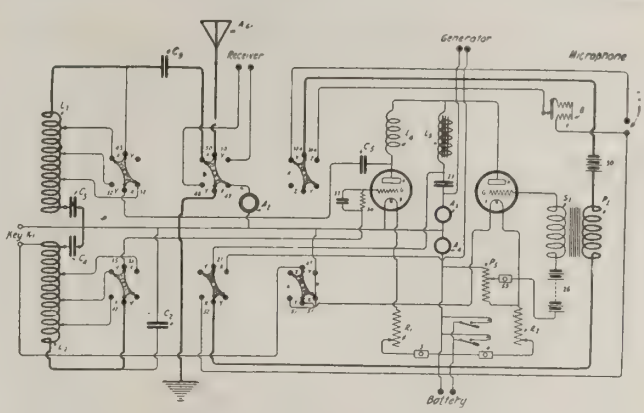


Fig. 4—Diagram showing the arrangement and wiring of the control switches

The Support of the Pliotrons

To insure against breakage, the best position for the pliotrons is vertical, with the large neck at the bottom. This brings the plate terminal cap at the top and the filament and grid terminal cap at the bottom. In each of the two dilecto rings shown at the top of the photograph, three spiral springs placed 120 degrees apart support a spring cap which fits over the plate terminal cap of the pliotrons. The springs are held by small machine screws which pass through the insulating ring. One of these serves as a terminal, being connected by a pig-tail to the spring tap. In each of the two bottom dilecto rings, three spiral springs, placed 120 degrees apart support a special jack block made to take the filament and grid terminals. This block is made in two halves, upper and lower, held together by screws; clamping these spring jacks between them, three posts, which project from the bottom of the jack block, take the ends of the three supporting springs, and are electrically connected by a copper pig-tail to the screw-eyes that hold the other end of the spring to the dilecto ring. The two filament terminals of the tube and the grid terminal are brought out to the three screws in the dilecto ring. Thus, each pliotron is supported to the rigid frame of the set by 6 springs which are set so that when the tube is in place the top springs pull down and the bottom springs pull up.

The mechanical period of vibration of the vacuum tubes in this spring mounting is considerably below that of any vibration that will occur in the seaplane itself. Sudden shocks in any but a horizontal direction are not transmitted through these springs with sufficient violence to injure the tubes.

(*Continued on page* 652)

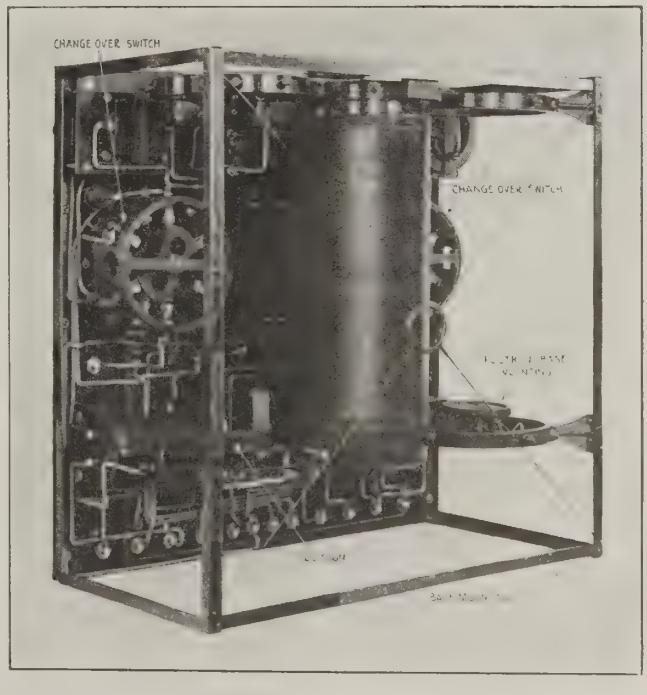


Fig. 5—Rear view with bulbs removed to show the excellent switch construction

THE PROPERTIES OF BALSA WOOD

By R. C. CARPENTER, M. Am. Soc. C. E.

BALSA wood grows extensively in the Central American and northern South American States as a second-growth tree. It is the lightest wood known, so far as any evidence attainable is concerned. This paper shows the microscopical structure and also gives various tests of its transverse and compressive strength. The material is composed of very thin-walled cells, which are barrel-shaped, interlace with each other, and are almost devoid of woody fiber. These cells are filled with air, making a natural structure well adapted to prevent the transmission of heat, because of the particles of air imprisoned in the material without interconnecting fibers.

Balsa wood has been used quite extensively in the past as a buoyancy product for life preservers and in connection with the fenders of life-boats and rafts. Its life is short, under ordinary conditions, unless treated with antiseptic or preservative material. There is promise that it will have a field of usefulness, in the lines referred to, which must make it of considerable interest to the engineer who requires either insulating material or buoyancy products. It is also used for streamlining on aeroplanes in places where strength is not of prime importance.

Very little information is available respecting the wood of the balsa tree. The wood which grows in the Isthmus of Panama is remarkable: first, as to its lightness; second, as to its microscopical structure; third, as to the absence of woody fiber; fourth, as to its elastic character, in the sense of recovery from transverse deformation; and fifty, for its insulation qualities for heat. It is the lightest wood commercially useful, so far as the writer has been able to ascertain, and it has considerable structural strength, which makes it suitable for a fairly extensive use.

The Weight of Balsa Wood

Balsa wood, when thoroughly dried, has a specific gravity of 0.11. For reference, Table 1 shows the relative weights of various woods. Until recently, Missouri cork wood, weighing 18.1 lb. per cu. ft., was supposed to be the lighest, but recent investigations indicate that balsa wood is much lighter having a weight of 7.3 lb. per cu. ft. The ordinary commercial balsa wood is seldom perfectly dry, and, because of the moisture content, its weight, as appears from a number of investigations made by the writer, will usually be between

TABLE 1.—Weights of Woods.

Common name.	Scientific name.	Weight, in pounds per cubic foot.
Balsa	*Ochroma lagopus*	7.3
Cork	(Bark from cork oak, *Quercus suber*)	13.7
Missouri corkwood	*Leitneria floridana*	18.1
White pine	*Pinus strobus*	23.7
Catalpa	*Catalpa speciosa*	26.2
Cypress	*Taxodium distichum*	28.0
Douglas fir	*Pseudotsuga mucronata*	32.4
Sycamore	*Platanus occidentalis*	35.5
Red oak	*Quercus rubra*	40.5
Maple	*Acer saccharum*	43.0
Long-leaf pine	*Pinus palustris*	43.6
Mahogany	*Swietenia mahogoni*	45.0
Locust	*Robinia pseudo acacia*	45.5
White oak	*Quercus alba*	46.8
Hickory	*Carya alba*	54.2
Live oak	*Quercus virginiana*	60.5
Ironbark	*Eucalyptus leucoxylon*	70.5
Lignum-vitæ	*Guaiacum sanctum*	71.0
Ebony	*Diospyros*	73.6
Black ironwood	*Krugiodendron ferreum*	81.0

8 and 13 lb. per cu. ft. As will be seen from Table 1, however, it is much lighter than cork.

Cellular Structure of Balsa Wood

The cellular structure of balsa wood, as exhibited under a microscope, differs from that of any other wood known to the writer. All engineers know that wood is made up of a series of interlacing cellular bodies of microscopic size which, when joined together, form fibers which extend both radially and longitudinally. These cellular fibers are interlaced, and, by their form and arrangement, give the wood its strength and physical properties. In ordinary woods the thickness of the walls of the cells is generally a considerable proportion of the diameter. The cells which are parallel to the axis of the tree are made up principally of woody fiber; those which extend in a radial direction usually have a cellulose structure with little woody fiber, and are defined as "medullary rays," or pith cells, because of their position and composition. The microscopic structure of all the woods involves, in addition, the existence of ducts or vessels scattered through the wood in a longitudinal direction; these serve as a circulatory system for the transmission of liquids and gases during the growth of the tree.

Gross Characteristics

In general appearance, balsa wood resembles basswood. Its medullary or pith rays are uniformly spaced, and are quite prominent in both the radial and cross-sections. In the radial sections they appear much as in maple or sycamore, as well as basswood, but lack the hardness and susceptibility to polish possessed by these woods. The ducts, pores or vessels are large and remote from each other and occur singly or in groups in the strands between the pith rays.

The lightness of the wood is one of its most striking features. This is due to the thinness of the walls of the elements. There is rather indistinct evidence of annual rings

TABLE 2.—Transverse Tests of Balsa Wood.

No.	Dimensions, in inches.	Modulus of rupture.	Deflection, in inches.	Quality.	Where made.
A	1¾ by 2½ by 20	2 880	.....	Medium	Cornell.
B	1¾ " 2½ " 20	3 290	.....	Clear	"
C	1¾ " ½ " 20	.....	0.847	Clear	"
D	1¾ " ½ " 20	.....	1.123	Clear	"
1	5 by 5 by 96	3 500	2	Clear	M. I. T.
2	1¾ " 4½ " 96	3 600	1 5/16	Poor	"
3	1¾ " 4½ " 96	2 960	1¼	Very poor	"
4	3 1/16 " 4½ " 96	3 300	2 9/32	Clear	"
5	1⅞ " 5⅛ " 96	3 207	.....	Clear	"

Weight of Specimen *A*.....13.19 lb. per cu. ft.
" " " *B*.....10.05 " " " "
Average weight of Nos. 1–5.....13.2 " " " "

in the cross-section. In the specimens studied, the regular concentric rings, so characteristic of trees of temperate regions, do not show.

Minute Structure

The pith, or medullary ray cells have normal position and form, but the cells are not elongated radially to so great an extent as is usually found in woods. The ducts are large, with rather thin, pitted walls Woody fibers of the ordinary sort seem to be absent in this wood, their place being taken by a cellulose tissue very much like the thin-walled tissue of the pith and cortex of ordinary trees.

The cells making up this tissue are barrel-shaped, whereas woody fibers are taper-pointed and relatively much longer. The most remarkable thing about them, however, is their exceedingly thin, unlignified walls. A section of the tissue in question, examined under a microscope, would not be taken for wood, but rather thin-walled cells or "parmchyma" from the pith or cortex of a stem. The only lignified part is the wall of the duct, and that is relatively weak.

Conclusions

1.—The gross structure of balsa wood is in appearance like basswood, poplar or willow.

2.—Its weight shows that it is fundamentally different from these.

3.—Its minute anatomy is radically different from any wood known to the writer.

4.—What correspond to the woody fibers are not lignified. They are very thin-walled and soft.

5.—The ducts or pores are weakly lignified and are pitted. They, however, constitute a very small proportion of the wood.

6.—The pith rays are also thin-walled and not lignified.

The Strength of Balsa Wood

Table 2 shows tests made under the writer's direction at Sibley College, Ithaca, N. Y., and also as reported by Professor Walter S. Leland, formerly of the Massachusetts Institute of Technology.

Crushing and Compression Tests*

Three specimens, each 1¾ by 2½ by 4 in., with a cross-section of 4.375 sq. in. gave an average of 2,488 lb. per sq. in. Another test of three specimens gave an average of 2,225 lb. per sq. in.

Three specimens, 1 by 1 by 3 in., crushed with loads of 2,210, 2,380, and 2,530 lb. per sq. in., respectively.

Two compression tests, of specimens 1 by 1 by 16 in., showed maximum loads of 1,860 and 1, 980 lb., and net compression of 0.69 and 0.55 in., respectively.

One specimen, 5⅞ by 5⅞ by 23 25/32 in., crushed under a load of 40,900 lb., equivalent to 2,500 lb. per sq. in.; and one slightly smaller gave substantially the same strength per unit of section as reported by Professor Leland in Table 2.

Professor Leland states:

"The crushing strength seems to be very satisfactory for such wood—about one-half the strength of white pine or spruce.

"These tests show the modulus of rupture to be approxi-

mately one-half that of good spruce, and their uniformity clearly shows that the material may be relied on both for direct compression and transverse loads.

"It is very elastic material, and when the load was almost at the breaking point, the load on three of the beams was removed and the beams resumed their original shape.

"It is exceedingly interesting to note that it is practically impossible to split the wood by driving nails through it."

A balsa wood plank supported on horses, the plank being 5½ in. wide, 1¾ in. thick, and 10 ft. 8 in. between supports, carried two men. The weights carried were 187 and 200 lb., respectively. The maximum deflection at the center was about 10 in.

The Habitat

In a recent trip to the Isthmus of Panama the writer found balsa trees growing commonly in all the cleared spaces which were not under cultivation in the Canal Zone. Most of these trees were of small diameter, and evidently quite young, and in every instance they were found in the newly started jungle which has recently been allowed to grow over a goodly part of the Canal Zone since the canal has been completed. In some cases these trees were growing vigorously in the masses of material sliding into the canal. The tree is characterized by a large leaf, from 14 to 30 in. in greatest length, and by the peculiar seed pods which it bears when it reaches a larger size. Excellent evidence was obtained that the balsa tree grows very rapidly, and attains a diameter of from 12 to 14 in. at an age of 4 or 5 years. Rear-Admiral H. H. Rousseau, M. Am. Soc. C. E., now in charge of considerable construction work in the Canal Zone, told the writer that a balsa tree which was growing near his house at Culebra attained dimensions approximating 12 to 14 in. in diameter and from 40 to 60 ft. in height, in about 4 years. A considerable quantity of balsa of large size is to be found near the cleared plantations along the Chagres River, and in various other places near the Atlantic Coast and the banana plantations.

The result of an investigation of the forests of a number of tropical countries, by Mr. Herbert Paschke, undertaken for Capt. A. P. Lundin, indicates that balsa trees are found in considerable quantities in Honduras, Costa Rica, Colombia and Jamaica, and there is abundant evidence that it grows vigorously in most of the tropical countries of South America. The report referred to indicates that the balsa or *ochroma* is entirely a second-growth wood, and is never found in the virgin forest, except as an isolated tree or two where clearing has occurred. The writer also learned, from his visit to the tropics, that forests composed of any one species do not exist in tropical countries, as they are found in the United States. Tropical trees always grow individually or by themselves, and very rarely in close proximity to other trees of the same species. This fact makes it necessary to spend considerable sums for transportation in gathering any tropical timber, as great distances through the jungle have to be traversed in order to obtain the timber of a single tree.

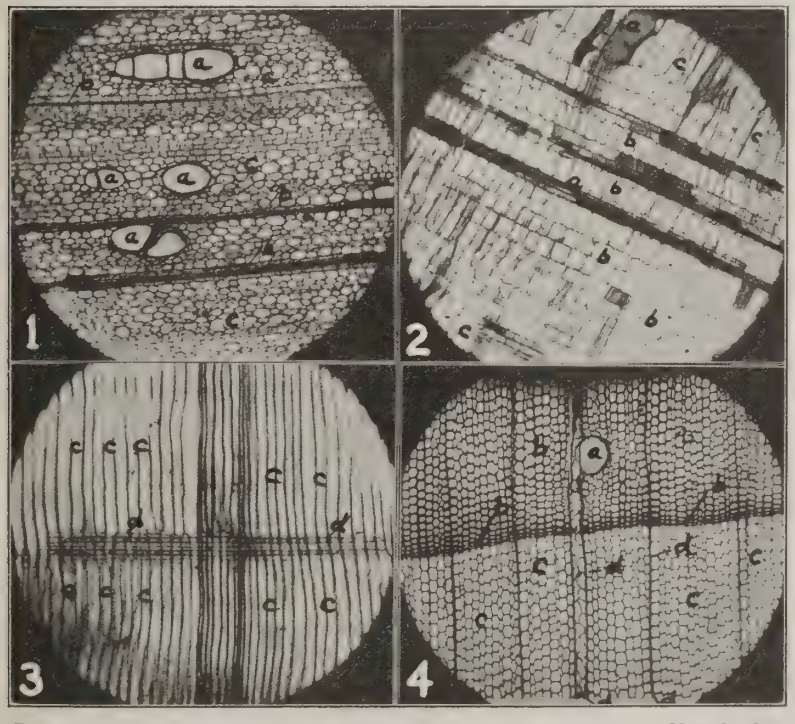
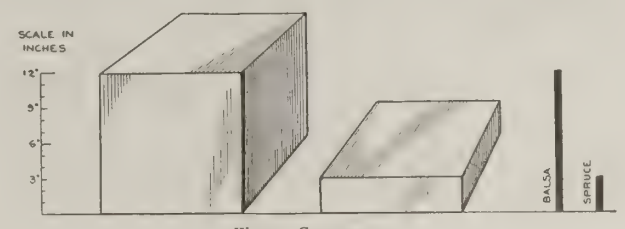
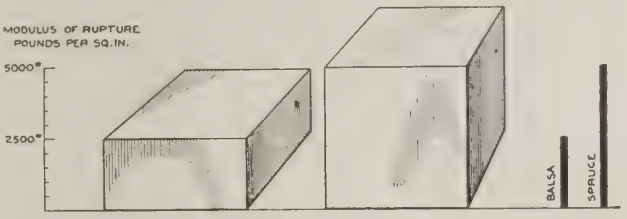


Figure 1—Balsa cross section. Figure 2—Balsa radial section: a—Vessels, b—Medullary Rays, c—Cells constituting longitudinal fibers. Figure 3—White pine. Radial section at annual ring: c—Pitted Tracheids or longitudinal cells, d—Medullary Rays. Figure 4—White pine cross section at annual ring: b—Old cells upper part with thick walls, new cells below with their walls, a—Vessels or ducts, b—Longitudinal cells (old), c—Longitudinal cells (new), d—Medullary Rays



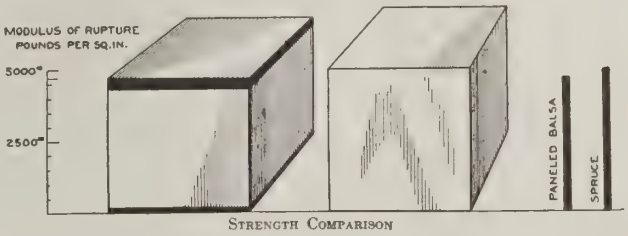
WEIGHT COMPARISON

Balsa Wood	Spruce
Bulk: 1 cubic foot	Bulk: ¾ cubic foot
Weight: 7.0 pounds	Weight: 7.0 pounds



STRENGTH COMPARISON

Balsa Wood	Spruce
2520 lbs. per sq in	5000 lbs. per sq in



STRENGTH COMPARISON

Paneled Balsa Wood	Spruce
4700 lbs. per sq. in.	5000 lbs per. sq. in.

Paneling increases the weight of Balsa Wood about 15 per cent.

WEIGHT AND STRENGTH COMPARISON OF BALSA WOOD AND SPRUCE

It is thought that the first person to make any extended commercial use of balsa wood was Capt. A. P. Ludin, President of the Welin Equipment Company, and formerly connected with the Pacific Mail Steamship Company. From his travels in tropical waters Capt. Lundin knew of the extreme lightness of this wood, and its value as a buoyancy material in life preservers and life-boats was suggested by its properties. When he undertook to apply the wood practically, however, he found that it was of little value because it absorbed moisture in great quantities, and also because it soon rotted, and also warped and checked when worked. He then undertook the discovery of some means of treating the wood which would render it waterproof and also prevent it from changing its shape. After testing nearly every method that had been suggested, Col. Marr's method of treating woods, which had been recently patented, was finally successful. In this method the wood is treated in a bath, of which the principal ingredient is paraffin. by a process which coats the interior cells without entirely clogging up the porous system. The paraffin remains as a coating or varnish over the interior cell walls, preventing the absorption of moisture and the ill effects as to change of volume and decay which would otherwise take place; it also prevents the bad effects of dry rot, which follows the use of any surface treatment for preserving wood of the balse type.

The Marr process tends to drive out all water and make the wood water-proof; it improves the quality of being readily worked with tools, without material increase of weight.

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* Except where otherwise noted, these tests were mad e at Cornell University.

The AIRCRAFT TRADE REVIEW

Merger of Wright-Martin with Motor Company Under Way

Negotiations are in progress involving a merger of the Wright-Martin Aircraft Corporation and the International Motor Truck Corporation. Hayden, Stone & Co. are acting as the bankers in the deal.

It was said that the consolidation would be effected by having the motor truck company take over the business of the Wright-Martin property. The latter, it was stated, would continue to manufacture aeroplane motors only as the business was offered. The activities of the new corporation will be confined mainly to the manufacture of motor trucks.

Official denial was made of reports that the merger will be followed by the retirement of the Wright-Martin preferred stock, of which $5,000,000 is outstanding. It is likely, however, that the 7 per cent dividends which have been cumulative since November 1, 1916, will be paid off in cash.

When the Wright-Martin Aircraft Corporation was incorporated, on September 13, 1916, it acquired the Wright Company, the Glen L. Martin Company, the Simplex Automobile Company, the Wright Flying Field, Inc., and the General Aeronautic Company of America, Inc. The plants are located at Los Angeles, Cal.; New Brunswick, N. J.; Hempstead Plains, L. I., and Port Washington, L. I.

An interest of the company said yesterday that it was intended to complete its contracts with the United States government for Hispano-Suiza motors. After this has been done it is estimated the company, after paying all debts and collecting all bills, will have in the neighborhood of $7,000,000 cash, plus the New Jersey plant, which is estimated to be worth about $2,500,000.

Motors of C-5 Gave Good Account of Themselves

Oakland, Cal.—The engines of the navy dirigible C-5, which drove her from Montauk, L. I., to St. John's, N. F., a distance of 1,110 miles, in 23 hours 50 minutes, an average speed of 43 miles an hour, were constructed in the plant of the Union Gas Engine Company.

Less than 200 gallons of gasoline and a little more than six gallons of oil were consumed on the trip. This is considered remarkable by local engine builders, in view of the heavy weather encountered.

The telegram to Fischer, which is from S. H. Blackburn, chief in charge of the C-5, and is dated St. John's, May 15, reads: "Motors on C-5 dirigible made trip fine without any attention from Montauk, L. I. Up twenty-six hours. Expect to leave for England in the morning if ship is ready."

G. S. Ireland Runs the First Exclusively Aeroplane Salesroom

G. S. Ireland has the distinction of being the first man in the United States to open up a showroom and sales office devoted exclusively to the marketing of commercial aeroplanes.



Mr. G. S. Ireland, President and General Manager, Curtiss Eastern Aeroplane Co. of Philadelphia

Mr. Ireland is president and general manager of the Curtiss Eastern Aeroplane Corporation of Philadelphia and he will act as distributor of Curtiss aeroplanes and flying boats in that territory.

In addition to his showroom, Mr. Ireland is planning to operate a land and water-flying school and he has recently opened one of the most modern landing fields in the country.

Before the outbreak of the war, Mr. Ireland had learned how to fly at the Curtiss school at Miami, Fla. He offered his services to the government and was made a civilian instructor at Mineola. Later he was sent to Rich field, at Waco, Texas. He left Waco, to take charge of the wing construction on the first Handley-Page bombing machine to be built in this country at Elizabeth, N. J. Being barred from actual flying service by the age qualifications, he enlisted in the army as a private and was assigned to the aviation section. He was later commissioned a captain in the flying service.

Geo. W. Browne Appointed Curtiss Distributor for Middle West

George W. Browne, prominent in the Middle West as a distributer for the Willys-Overland Company, has been appointed a Curtiss distributer for the middle states. He has opened offices in Milwaukee and Chicago, and Lee Hammond, recently of the United States Naval Aviation service, is manager. Mr. Hammond, who was a lieutenant commander in the navy, only recently secured his discharge. For the last few months he has been stationed on board the U. S. S. Mississippi at Guantanamo Bay, Cuba, where he conducted experiments for the Navy in launching land machines for scouting and "spotting" purposes from the decks of the battleships. He was the first man to fly from the deck of a ship. During the greater part of the war, he was in charge of all aviation activities at the Great Lakes Naval Training Station, Illinois, the largest naval training station in the world.

Personal Pars

Hal G. Trump, for the last four years manager of the Chicago office of the Green-Fulton-Cunningham Company, has joined the staff of the Campbell-Ewald Company, Detroit, Chicago and New York. Mr. Trump will make his headquarters at the Detroit office.

First Lieut. Raymond Garey, recently discharged from the Air Service, is now connected with the Academy of Applied Aeronautics in Chicago, Ill., as general superintendent. Lt. Garey's Air Service work of preparing all technical material for use in instruction in the Aviation Mechanics Schools, as well as his connection with Air Service publications, has preeminently fitted him to fill this important position.

Andrew V. Terek, recently released from the Naval Aviation Service, has returned to the Bantam Ball Bearing Co., Bantam, Conn., as master mechanic in charge of the upkeep of the factory.

Mr. William Beckman has resigned as experimental engineer from the Duesenberg Motors Corporation to become engineer and eastern representative for the Beckman Metal Products Co., whose main offices are located at Cleveland, Ohio.

Mr. R. L. Corey, recently appointed Manager of the Chicago office of the National Gauge & Equipment Company, located in the Railway Exchange Building, was formerly associated with S. F. Bowser & Company, Fort Wayne, Indiana.

During the war Mr. Corey was Assistant Manager in charge of aeroplane instruments in the Production Engineering Department, Bureau of Aircraft Production.

Electrically Operated Tachometer Successfully Designed

A successful aeroplane tachometer employing electric drive for use on aeroplanes and dirigibles is described in the German publication, *Der Motorwagen*. The device consists of a small D.C. generator driven from the engine shaft, which acts as transmitter. The current generated is received by a moving coil galvanometer whose scale is graduated in revolutions per minute.

The armature of the generator is of drum type, and permanent magnets made of high alloy tungsten steel provide an even magnetic field, the whole being enclosed in a dustproof bayonet-joint cap. The moving coil of the receiving galvonometer is wound on a pressed copper frame and fitted with flat spiral springs which also serve as leads from the generator. The instrument is known as the Morel Electric Indicating Tachometer.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative

PILOTS

Dana C. DeHart
Edward V. Gardner
Ira O. Biffle
Leon D. Smith
Gilbert G. Budwig
Trent C. Fry

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

PILOTS

E. Hamilton Lee
Lester F. Bishop
Carroll C. Eversole
John M. Miller
Charles E. Bradley
Max Miller
Frank McCusker

Chicago-Cleveland Aero Mail Route Makes High Record of Reliability

The Air Mail Service established May 15, 1919, between Chicago and Cleveland, has completed a very remarkable record of dependability for the first week of its operation.

A report of the weeks' operations shows that 4,160 miles have been flown out of a possible 4,480 miles and 28 trips made out of 30, scoring 93 1/3 per cent performance. There was not a single forced landing for any reason. A 43-mile gale prevented the two flights which were missed.

From Cleveland westbound to Chicago a total of 87,200 letters were carried for the week, and 74,600 letters eastbound from Chicago to Cleveland.

The average flying time for the week from Cleveland to Chicago was 3 hours and 40 minutee, and from Chicago to Cleveland 3 hours and 20 minutes, the difference being due to the prevailing head winds from the west. The distance between Chicago and Cleveland is 325 miles. The best time made was on one trip from Chicago to Cleveland in 2 hours and 48 minutes. The longest time was 4 hours from Cleveland to Chicago.

G. G. Budwig in Charge of Testing and Delivering New Mail Planes

G. C. Budwig, whose photograph we published last week, and who is in charge of the testing of the new De Haviland mail planes at Belmont Park, N. Y., and who flies the machines to Bellefonte, Pa., and Cleveland, Ohio, for final delivery to the Western Division of the Aerial Mail Service, learned to fly on a Wright hydroaeroplane early in 1914. When he had completed his instruction, he engaged in exhibition and passenger carrying work. After a period of inactivity, he resumed flying at the outbreak of the war, when Budwig went to the Curtiss school in Buffalo and learned the "Dep" control. Thereafter he worked as civilian flying instructor at the following government fields: Chaunte Fields, Kelly Field, Rockwell Field, and March Field.

While at San Antonio, Budwig also acted as Chief Instructor of the Stinson School of Flying. At Rockwell Field he was at first Dual Instructor and later Acrobatic Instructor. For two months following his transfer to March Field, he was an instructor in acrobatics, and was then advanced to Stage Commander of Final Review. He remained in the government service until the position of Civilian Flying Instructor was abolished by the Secretary of War.



Lester F. Bishop, the first aerial mail pilot to carry letters from Chicago to Cleveland

Lester F. Bishop Made Pioneer Mail Flight of Cleveland-Chicago Route

Lester F. Bishop, the first Air Mail pilot to carry mail into Cleveland from Chicago, entered the air game as a mechanic for the Champion Aeroplane Company of Chicago, Illinois, in 1915. He received his first training in flying in the spring of 1916 and until June, 1917, was connected with Eddie Stinson and R. F. Shank in conducting the National School of Flying at Houston, Texas. In June, 1917, he was appointed Student Flying Instructor at Chanute Field, Rantoul, Illinois. In September, 1917, he was transferred to the Selfridge Field, Mt. Clemens, Michigan, and on December 1st was transferred to the Rich Field at Waco,, Texas, at which field he was assigned as acrobatic instructor. He remained at this field until July 15, 1918, when he was assigned as test pilot for the Bureau of Aircraft Production, Detroit District, testing the DH4 Bombing planes preparatory to their being shipped overseas. He was engaged in this work until his appointment in the Aerial Mail Service on December 27, 1918. Up to the present time he has flown over 1,500 hours with but two slight accidents.

Only One Forced Landing on Cologne Mail Route

London.—The aerial mail service between Maiscoucille and Cologne, a distance of 225 miles, reports that after three weeks of operation there were only three days when the weather prevented the mails being carried, and there was only one forced landing; 465 bags of mail were carried, and the average time for all flights was 2 hrs. 16 min., while the record was 1 hr. 45 min. On the majority of days on which the mails were carried from March 1 onwards it was found impossible to continue the training of the homing pigeons attached to the unit. Moreover, as it was necessary to fly through driving rain, specially protected propellers had to be supplied, as the rain so seriously damaged the ordinary type during one journey that they became unsafe for further use. D.H.-9A planes, operated by the 110th Aero Squadron, are used.

Book Review

AEROPLANE CONSTRUCTION AND ASSEMBLY, by N. W. Leslie and J. T. King. This book is an excellent treatise for the aeroplane mechanic. The first section of the book is devoted to nomenclature and definitions. A comprehensive set of diagrams gives the location of every part of the fuselage, wings and controls. Then follow instructions for unpacking a plane and setting it up, and adjusting and truing the wings. Installation and care of the motor, inspection and preparation of the engine before flights is adequately dealt with. Care, alignment, balancing and checking the pitch of propellers is described in terms which are easily comprehended by the aeroplane mechanic. The care and inspection to be given a plane after flight is the subject of several comprehensive pages.

The second part of the book is devoted to a study of the materials used in the construction of an aeroplane and the theory of flight. The qualities of the various types of wood used for different purposes, the design of all types of shackles, turnbuckles, fittings of all types, strut sockets, clevis pins and cables are described and illustrated. A section of this part of the book is devoted to a discussion of methods of aligning the fuselage and correction of mistakes in rigging.

NAVAL and MILITARY AERONAUTICS

Sales of Surplus Aircraft Supplies

Washington, D. C.—According to an official statement from the Director of Sales, the sales of surplus materials have been as follows:

	Mar. 15-21	Mar. 22-28	Mar. 29 April 4	April 5-11	Total
Bureau of Aircraft Production	$11,093		$59,302	$105,620	$1,092,645
Dept. of Military Aeronautics	52,484	$5,310	2,780	6,686	466,436
Totals	$63,577	$5,310	$62,082	$120,306	$1,579,181

Of the amounts of which the cost is known, the following statement is made regarding the ratio of cost to amount received: The Bureau of Aircraft Production received $1,089,186 for material costing $1,211,825, or 90 per cent. of its cost. The Department of Military Aeronautics received $455,436 for material costing $625,772, or 73 per cent. of its cost.

Sales by the Bureau of Aircraft Production since the above tabulation were as follows: Week ending April 18, $8,099; April 25, none; May 2, none; May 9, $16,856, making a total of $1,450,528 since November 11.

For the Department of Military Aeronautics, the figures are as follows: Week ending April 18, $5,096; April 25, $1,775; May 2, $423; May 9, $20,911, making a total of $493,661 in sales.

Balloon Flights Reveal Metereological Data

A balloon ascension to study upper currents and meteorological conditions over Nebraska, Arkansas, Missouri and Mississippi under influence of the great rivers, was carried into effect recently from the United States Army Balloon School, Ft. Omaha, Nebraska.

Lt. Col. J. W. S. Wuest's balloon, maintaining a 5,000 elevation, landed at 2:30 in the afternoon near Little Rock, Arkansas, 500 miles, having been in the air 16 hours. Capt. Goodale's balloon, maintaining 10,000 feet, landed at 1:30 P.M. at Arcola, Miss, 600 miles, having been in the air 15 hours, the speed being faster at the higher elevation. The upper currents confirm the theory of meteorologists in running parallel to isobars. Other scientific data is in course of preparation from notes taken on the voyage.

Target Practice Required of Air Service Men in Aerostatic Branch

Instructions are being issued prescribing target practice for the Air Service. These instructions apply only for this season. For Lighter-than-air Organizations rifle and pistol practice is prescribed for those armed with these weapons. Heavier-than-air Organizations will not be required to participate in target practice for 1919 unless it obviously does not interfere with other work, and Air Service personnel, not included in either category, will be excused from target practice during the season of 1919.

Plane and Engine Deliveries Before and After Armistice Announced

Washington, D. C.—The following is an official statement from the Statistics Branch of the General Staff.

All orders for planes and engines have been completed except one order for Hispano-Suiza 300 H.P. service engines, which is forecast for completion in May.

The number of planes and engines delivered before and since the date of the armistice, with the percentage distribution, is shown in the following table:

ARTICLE.	Before Armistice.	Since Armistice.	Total.	Per cent. delivered. Before Armistice.	After Armistice.
Planes.					
SJ-1, training	1600	0	1600	100	...
Penguin, trainng	300	0	300	100	...
S4B, training	100	0	100	100	...
Handley-Page, service.	101	6	107	94	6
JN4-D, training	3746	346	4092	92	8
JNH, training	1690	274	1964	86	14
S4C, training	372	125	497	75	25
DH-4, service	3227	1615	4842	67	33
Le Pere, service	7	18	25	28	72
E-1, training	12	116	128	9	91
SE-5, training	5	52	57	9	91
Engines.					
A7A, training	2250	0	2250	100	...
Lawrence 28 H.P., tr.	450	1	451	100	...
Gnome 100 H.P., tr.	278	2	280	99	1
OX-5, training	8318	1182	9500	88	12
Hispano 150 and 180 H.P., training	3905	1170	5075	77	23
U. S. 12 Navy type, service	3645	1695	5340	68	32
U. S. 12 Army type, service	9929	5209	15138	66	34
Le Rhone 80 H.P., tr.	1057	1443	2500	42	58
Bugatti, service	8	32	40	20	80
Hispano 300 H.P., ser.	8	359	367	2	98
U. S. 8 Army type, service	0	15	15	...	100

Twelve Per Cent American Planes at West Front When War Ended

The following statement was prepared by Statistics Branch of the General Staff:

Comparison of Aeroplane Strength of Allies and Enemy Air Service at Date of Armistice

French and Belgian Front	*Number of Planes*
French	3,321
German	2,730
British	1,758
American	740
Belgian	153
Total Allied	5,972
Total Enemy	2,730
Italian Front	
Italian	812
Austrian	622

Comparison of Balloon Strength of Allied and Enemy Air Services at Date of Armistice

French and Belgian Front	*Number of balloons*
German	170
French	72
British	43
American	23
Belgian	6
Total Allied	144
Total Enemy	170
Italian Front	
Italian	32
Austrian	26

More Aircraft Contract Cancellations Withdrawn

Washington, D. C.—According to an official statement issued by the Statistics Branch of the General Staff, during the four weeks ended April 26, 1919, the Bureau of Aircraft Production withdrew cancellations and suspensions of contracts to the amount of $6,944,144, thus reducing the total cancelled and suspended contracts to $493,735,473. These withdrawals are practically all for the spare parts and accessories. Following is a summary of the value of cancellations and suspensions of contracts with the per cent suspended:

	Total Obligations	Total Suspensions	Per Cent Suspended
Chemicals and chemical plants	$15,285,255	$14,203,006	93
Instruments and accessories	12,830,326	10,517,212	82
Aeroplanes and spare parts	210,530,651	165,727,433	79
Fabrics, lumber and metals	9,347,244	6,926,223	74
Engines and spare parts	410,188,300	276,062,132	67
Balloons and supplies	16,442,168	9,497,494	58
Miscellaneous	22,369,092	10,801,973	48
Total	$696,993,036	$493,735,473	71

From the date of the armistice to April 26, 1919, cancelled and suspended contracts representing an original value of nearly $118,000,000, have been liquidated at a saving of over $92,000,000 or 78 per cent.

In the following diagram is shown the per cent of actual saving and per cent cost of termination of contracts, for various items:

	Value of Cancelled Contracts	Termination Charges	Per Cent Actual Saving	Per Cent Termination Charges
Balloons and supplies	$3,834,664	$613,032	84	16
Engines and spare parts	96,385,892	20,752,433	78	22
Fabrics, lumber and metals	3,810,088	833,140	78	22
Aeroplanes and spare parts	4,346,850	1,073,622	75	25
Chemicals and chem'l plants	7,308,948	1,939,890	73	27
Instruments and accessories	1,340,972	393,994	71	29
Miscellaneous	912,611	193,032	79	21
Total	$117,940,025	$25,799,143	78	22

The present status on Bureau of Aircraft Production contracts of which these were $696,993 outstanding on November 9, is as follows: Reduced by termination, $493,375, or 71 per cent; by delivery, $193,000 or 28 per cent.; outstanding $10,258 or 1 per cent.

Air Service Withdrawals From Appropriation Light

Washington, D. C.—A balance of $144,088,000, or 60 per cent., remains of the $360,527,000 appropriation to the Bureau of Aircraft Production on April 30. The Department of Military Aeronautics has a balance of $83,305,000, or 78 per cent. of its $107,476,000 appropriation in the treasury.

Special Training for Military Observers Planned

Washington, D. C.—Realizing the qualifications and technical knowledge required to successfully perform the duties of an aerial observer, special training is being planned by the Division of Military Aeronautics for the development of reserve officers for this line of duty.

Aerial observers must be familiar not only with the duties of the military aviator, but also with the work of the artillery officer, requiring a thorough grounding in the science of ballistics.

Students electing aerial courses under the R. O. T. C. are to be sent to air depots and gunnery or artillery schools to complete their training during the summer months. It is considered likely that flying training will be given to observers, even though their work does not require their being qualified military aviators.

Balloon Base to be Established at Camp Dix

Camp Dix, N. J.—That the United States is to establish its largest dirigible balloon base in this immediate vicinity became known today when a government balloon commission selected a site close to the camp. The tentative plans call for the where work on the dirigibles will be de- establishment of a balloon training school veloped.

Army Air Ferry at Stamford

Stamford, Conn., May 28.—An army aerial ferry has been established between Stamford and Mineola to convey recruits for the air service who desire to travel that way. All recruits in this district who desire to make the trip by air are sent here. Herbert Oeser, a Stamford recruit with previous military experience, was the first one to make it to-day. He went over in a plane piloted by Lieutenant Beau.

Special Orders Nos. 120-122

Capt. Samuel E. Jackson, report to Camp Devens, Ayer, Mass., for discharge.

Col. James E. Fechet, proceed to Fort Sam Houston, San Antonio, Tex., and report to the commanding general Southern Department for duty as department Air Service officer.

Capt. Herbert A. Thorndike, report to aviation repair depot, Montgomery, Ala.

Second Lieut. William T. Howley is transferred to Walter Reed General Hospital, Takoma Park, D. C., for further observation and treatment.

Second Lieut. William E. Cloe will proceed to Boston, Mass., and report to the district manager, Aircraft Finance, Little Building, Boylston and Tremont Streets.

Par. 210, S. O., No. 88-O, April 15, 1919, W. D., as directs First Lieut. George R. S. Denton to proceed to Camp Bragg, Fayetteville, N. C., is revoked.

So much of Par. 108, S. O., No. 112-O, May 13, 1919, W. D., as relieves the following-named officers from duty at Godman Field, Camp Knox, Ky., and directs them to proceed to Camp Gordon, Ga., is revoked: Second Lieut. Harry W. Langmead, Second Lieut. James E. Jones.

Leave of absence for five days is granted First Lieut. Matthew H. O'Brien.

Second Lieut. Franklin B. Russell is announced as on duty requiring him to participate in regular and frequent aerial flights from July 13, 1918.

First Lieut. Charles Robert Herold, report to Air Service Flying School, Brooks Field, San Antonio, Tex., and by letter to the Director of Air Service, Washington, D. C.

First Lieut. John Y. York, Jr., proceed to Dayton, Ohio, and report to the Chief of Engineering Division, Air Service, for temporary duty; then to Washington, D C., and report to the Director of Air Service for duty.

Second Lieut. Norman R. Wood, proceed to Washington, D. C., and report to the Director of Air Service.

Lieut. Col. Arthur J. Hanlon will proceed to Rockwell Field, San Diego, Cal., take station, assume command, and report by letter to the Director of Air Service, Washington, D. C.

Par. 27, S. O., No. 112-O, May 13, 1919, relating to Lieut. Col. Arthur J Hanlon is revoked.

Capt. David H. Young is relieved from further duty at Hazelhurst Field, Mineola, Long Island, N. Y., and upon expiration of his present leave of absence he will proceed to Dayton, Ohio, and report to the Chief, Engineering Division, Air Service, for temporary duty for the purpose of testing and witnessing flights of bombing planes; thence to Washington, D. C., and report to the Director of Air Service for duty.

Capt. William H. Smith is relieved from treatment at United States Army General Hospital No. 2, Fort McHenry, Md., and will proceed to Air Service depot, Garden City, Long Island, N. Y.

The following-named officers are relieved from their present assignment and duties in the Office of the Judge Advocate General, this city, and will report in person to the Director of Aircraft Production: First Lieut. John W. Halsey, Second Lieut. Robert N Denham, Jr.

Capt. Thomas B. Cassels is detailed for duty under the direction of the Director of Purchase, Storage and Traffic, and will report to the commanding officer, aviation general supply depot, Middletown, Pa., for duty as camp supply officer.

First Lieut. Franklin O. Carroll, proceed to Washington, D. C., and report to the Director of Air Service.

First Lieut. Edward H. Guilford, proceed to Fort Hancock, N. J., on temporary duty in connection with tests on long distance fire control, thence to Hazelhurst Field, Mineola, Long Island, N. Y.

Par. 84, S. O., No 107-O, W. D., May 7, 1919, directing Second Lieut. Robert K. Lloyde to proceed to Washington, D. C., is amended so as to direct him to proceed to March Field, Riverside, Cal.

Second Lieut. Leonard D. Weddington, proceed to Washington, D. C., thence to Langley Field, Hampton, Va.

First Lieut. Homer E. Whitney is relieved from further treatment at the United States Army General Hospital No. 2, Fort McHenry, Md., and will proceed to Air Service depot, Garden City, Long Island.

First Lieut. Schuyler E. Grey is relieved from further treatment at the United States Army General Hospital No. 2, Fort McHenry, Md., and will proceed to Air Service, Garden City, Long Island, N. Y.

Second Lieut. Daniel P. A. Willard is relieved from duty at United States Army General Hospital No. 31, Carlisle, Pa., and will proceed to United States Army General Hospital No. 11, Cape May, N. J.



Side view of the Curtiss "Hornet", model 18-B, two-seater biplane. It has a speed of 163 m.p.h. and climbs 16,000 feet in 10 minutes, with light flying load

FOREIGN NEWS

Adjutant Casale Makes 31,000 Foot Altitude Flight

Paris, May 28.—Adjutant Casale, a French aviator, in a flight for altitude ascended 31,000 feet. This constitutes a world's record.

Adjutant Casale, during the war, had numerous fights in the air and was credited with having downed twelve German machines.

Major Schroeder, U. S. Air Service, has held the world's altitude record of 29,500 feet for several months.

Aerial War on Revolting Arabs Saved Englishmen from Massacre

Assiut, Egyt.—Dr. Allgood, who had the chair of science at the College of Assiut, was one of the 400 foreigners who held off 5,000 Fellaheens and Senyussi Arabians in a siege lasting three days.

Following the murder of one Englishman and the cutting of communication wires, the 400 foreigners formed a garrison and prepared a place of defence. Two days of fighting resulted in the practical expenditure of all ammunition, but the certainty of a general massacre on the part of the natives made resistance imperative.

After two days of fighting a seaplane came from Cairo, about 250 miles to the north of us, manœeuvred overhead and then flew away. The besiegers saw it and renewed attack. A few hours later the 'plane came again, flying low and with good aim dropped a supply of ammunition into our stockade.

Later in the day another 'plane, which we afterward learned was laden to capacity with bombs, came down from Alexandria and with deadly aim bombed the enemy village, killing about 500 natives. On the third day our hopes brightened, for more aeroplanes came up and, flying low, poured a steady and it seemed never ending machine gun fire into the opposing forces. Finally gunboats coming up the river routed the Arabs and rescued the hard pressed garrison.

American Naval Aviator Flies from Copenhagen to Stockholm

Stockholm, May 27 (By the Associated Press).—Captain Batt, an American naval aviator, arrived here in his aeroplane at 10 A.M. May 26, having completed the final lap of his 350-mile trip from Copenhagen.

Captain Batt left Copenhagen in the evening of May 24 and made his first stop at Calmar, in Southern Sweden, 175 miles from his starting point, which he reached at 12:20 o'clock Sunday afternoon. Leaving there at 7 o'clock the same evening, he flew 150 miles to Nynashamn, a small port about twenty-five miles southwest of Stockholm. Taking the air again about 10 o'clock that night, he attempted to reach this place but lost his direction in the darkness and was forced to descend at Furusund, west of Stockholm.

International Aeronautic Federation Urges Air Ministries for All Nations

Paris, May 22.—The International Aeronautic Federation, in session here, has unanimously voted the following requests for the delegates from each country to present to their government representatives in charge of aerial affairs:

That the liberty of aerial navigation be re-established as soon as possible in conformity with the decision of the Peace Conference.

That civilian aeronautics in the various countries be placed under the control of the Aviation Ministry or Department.

That all the aero clubs affiliated with the International Aeronautic Federation be represented upon the International Commission on Aerial Navigation, which is to be created after peace is signed.

That in every country the National Aero Club be represented in the National Commission on Aeronautics.

Certain conditions under which the brevet of pilot aviator may be obtained were altered by the federation, and it was decided that regulations relative to the verification of aerial achievements should be modified. Other questions were carried over for the next session of the federation, which is to be held at Brussels in October.

Pershing's Orders to Liggett Go By Aeroplane

Coblenz, May 22.—Lieutenant General Liggett's headquarters at Coblenz received for the first time several packages of documents and orders from Paris by aeroplane. The journey was made in less than five hours and required only one relay.

D'Annunzio Resigns Commission in Italian Army

Rome, May 25.—Gabriele d'Annunzio, the poet-soldier, has resigned his Lieutenant-Colonelship in the aviation branch of the Italian Army.

Commercial Flying to Be Government Monopoly in Canada

The bill providing for the control and encouragement of flying in all its aspects, the issue of licenses, inspection of machines, and arrangement of air routes has reached its third reading in the Canadian Parliament. It is proposed to make the control of commercial flying a public monopoly.

Holt Thomas Suggests Employment of Aeroplanes in Handling Press News

In the course of his lecture on April 30, under the auspices of the Industrial Reconstruction Council, Mr. Holt Thomas outlined a scheme for combining the services of the aeroplane with the telephone and telegraph in the transmission of long urgent messages, which would be called aerograms. He said the general idea was to telephone or telegraph a message to the aerodrome where it would be taken down in shorthand, carried, say, to France in a plane, and dispatched from there to its destination. Such a system, he thought, would be invaluable for dealing with long Press cables. A message of 3,000 words between Paris and London could be delivered by aeroplane long before it had got across the cable. Moreover, the aeroplane would probably be carrying millions of words and other things as well at the same time. The economy in labor by the use of such a method would be enormous.

Handley Page Offered $5 an Ounce for Aerial Delivery from England

Messrs. Handley Page, Ltd., have been approached during the month by a commercial house which wished a quotation to transfer some scent essences from Shanghai to London by air. Provided the conditions of quick delivery could be satisfied, the price, they said, might range up to £1 per ounce. There is very little doubt but that within a year from date most lightweight transport, where great speed is essential, will go by aeroplane or airship. Important mails, legal documents, and, in urgency cases, bullion are obvious goods for air-express.

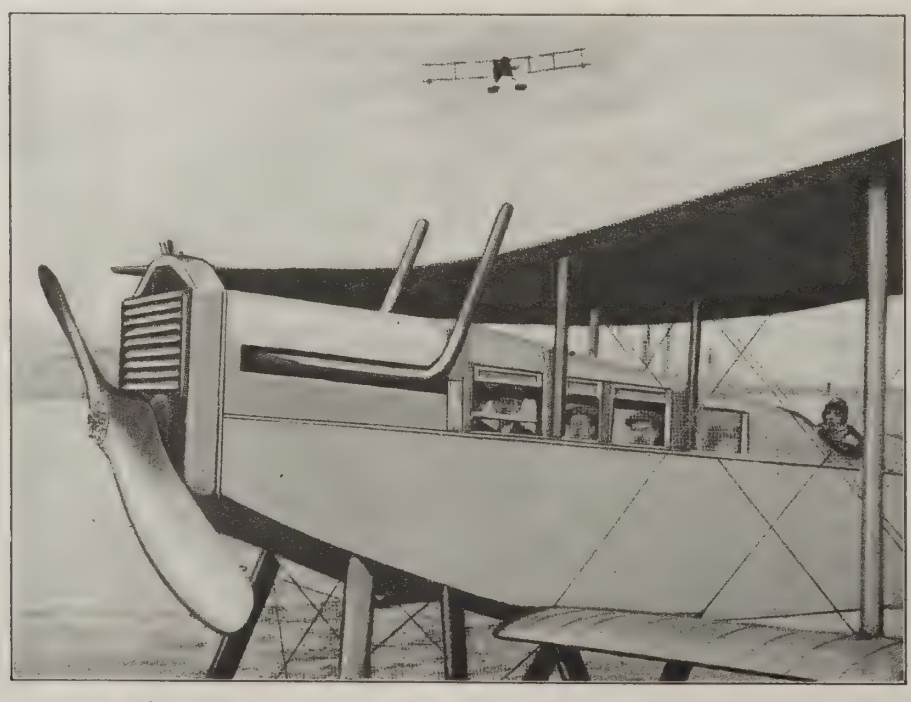
Paris-Geneva Service Opened

Geneva, May 26.—The Swiss airman, Durafour, carrying mails, made the first Paris to Switzerland flight on May 26, landing at Geneva.

The time of the flight was five and a half hours, including a half hour's forced landing on French soil owing to the fog. The distance is about 250 miles.

British Government to Restrict Long Ocean Flights

London, May 28.—The British Government was asked in the House of Commons recently by Sir Arthur Fell, the Channel Tunnel advocate, to consider the question of forbidding the flight of aeroplane over wide stretches of sea until aeroplanes have proved that they are capable of making flights over land of equal length with reasonable certainty.



The Short passenger carrier equipped with a 260 horsepower Maori engine

Aeronautical Commission at Peace Conference Has Completed Its Work

Paris, May 27.—The Aeronautical Commission of the peace conference has agreed to a complete draft of an air convention and its annexes, subject to some small amendments.

The convention itself deals with the following matters:

The nationality and registration of aircraft.

General principles governing the right of international flight.

Certificates of air worthiness and competency.

Principles governing flight over foreign territory.

Rules to be observed on departure or landing and when under way.

Prohibition of the carriage of certain objects.

The international commission for air navigation .

Final provisions:

Technical details are relegated to annexes in the following order:

The making of aircraft.

Certificates of air worthiness.

Log books.

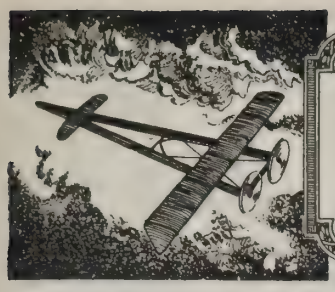
Rules as to lights and signals, and rules of the air.

Certificates of competency, including medical requirements.

International maps and ground marks.

Meteorological information.

Customs.



ELEMENTARY AERONAUTICS and MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W.
Washington, D. C.
CORRESPONDENCE MODEL AERO CLUB
320 N. Main Street,
Rockford, Ills.
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

Model Aeroplane Contest Prizes

The medals and the cup for the coming model aeroplane contests have been selected from a large stock of aeroplane jewelry and trinkets manufactured by the Arthur Johnson Mfg. Company, 14 Church Street, New York City. To say they are the most attractive ever offered for an event of this kind would be putting it mildly.

The cup for the scale model prize is of bronze of a very pretty design with two handles, and etched with silver. The interior is lined with gold. On the face of the cup are engraved the words AERIAL AGE TROPHY.

The medals of gold, silver, and bronze have on the face a figure of Victory holding a wreath in her extended hand. Under the wreath is a miniature aviation corps emblem, namely; a propeller with wings extending on each side from the propeller hub. This is in silver, which adds greatly to the appearance of the medals.

On the back of each medal the words AERIAL AGE MEDAL are engraved. The winners can have anything they desire engraved on the medals as sufficient space is left for this.

The winners of the above prizes will be envied by every model flyer who is not lucky enough to possess one, and when the next set of events comes around we will have to hold elimination contests to keep down the number of competitors.

The continued good weather of the last two weeks has brought out many good model flyers in this vicinity, and we hope out-of-town clubs are having the same good fortune.

I have received letters asking whether it is too late to enter the contests. It is not too late, in fact you have until the last day of June to compete, but I should not advise waiting until the last minute, as something might happen to prevent the contest being held, such as bad weather, or lack of witnesses.

By the time this issue is in your hands the contest will have begun and, let us hope, new records made.

Scale Model of the Loening Monoplane

The model shown in the accompanying photographs was made by the members of the Aero Science Club of New York.

This model is correct in every respect, regulation ribs, spars, etc., being used.

The engine is only a dummy, but is made exactly to scale of the 300 H.P. Hispano-Suiza engine, and can be clearly seen in the photograph. The model was made from plans which appeared in AERIAL AGE some time ago. The wings are covered with silk and the wing section is true to scale. This is the type of model which will be exhibited in the scale-model contest, and many of the members of this club are hard at work on other types.

The Aero Science Club is the oldest model club in existence and is ready to accept anybody into the club who is interested in aviation, whether it be in the models or in the larger machines. These young men are all hard workers and are strict students of aerodynamics. They are lucky inasmuch as they have on the membership list some of the oldest aeronautic men in the country, who are advisers of the club.

Two of these men are noteworthy: Mr. Durant, whose father was the first to jump from a balloon in this country, and Mr. S. Y. Beach, for some time Aeronautic Editor of the *Scientific American*, and an inventor of many aeroplane parts.

If you have any clear photographs of models send them to the Model Editor, and if they are of interest to the readers we will reprint on this page.

Should a young man continue to build models all his life, and not branch out to the study of the larger machines?

This is a question that many model fliers ask themselves, and a great number ask me, so I will answer it. After you feel sure that you know every trick and turn of model flying and you get so you can make scale models fly, by all means turn to the higher problem of aerodynamics, and if you cannot design, try to build a machine to carry at least one passenger. Many companies are advertising parts for light aeroplanes, and almost any model flier has the facilities for building and assembling a small size man-carrying aeroplane.

Most of the old-time model aeroplane builders built large machines soon after they took up model flying, and many of them taught themselves to fly These young men are to-day the best aeronautic engineers in the country, and are holding responsible positions with the Government and private concerns.

I intend starting another series of articles on the large machines in the near future and will devote most of the space of this page to this type of machine for about four or five issues. It is hoped that these articles will be received with as much favor as the last series covering the Design and Construction of the FORD MOTORED AEROPLANE.



Scale model of the Loening Monoplane, built by the members of the Aero Science Club



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Shakespeare as an Airman

I. The Squadron.

". . . All furnish'd, all in arms,
All plum'd, like estridges that wing the wind,
Bated, like eagles that have lately bath'd."
(*Henry IV, Pt. I, IV.*, 1.)

II. The Pilot to His Machine.

"When I bestride him, I soar, I am a hawk."
(*Henry V., III.*, 7.)

III. The Pupil to His Instructor.

"We could not stall together."
(*Antony and Cleopatra, V.*, 1.)

IV. The C.O. (*loq*).

". . . The air
Nimbly and sweetly recommends itself
Unto our gentle senses."
(*Macbeth, I.*, 6.)

"Ah! Stand by."
(*Antony and Cleopatra, III.*, 9.)

V. Chorus of Night-Raid Pilots.

"Sweet moon, I thank thee for thy sunny beams;
I thank thee, moon, for shining now so bright."
(*Midsummer Night's Dream, V.*, 1.)

VI. Chorus of Mechanics.

"Fly! Not we!"
(*Antony and Cleopatra, III.*, 9.)

VII. The Transport Officer.

"I am no Pilot."
(*Romeo and Juliet, II.*, 2.)

VIII. Taking Off.

"Now to the Goths, as swift as swallow flies."
(*Titus Andronicus, IV.*, 1.)

"The deep damnation of his taking-off."
(*Macbeth, I.*, 7.)

IX. In the Air.

"By heaven, methinks it were an easy leap
To pluck bright honour from the pale-faced moon,"
(*Henry IV., Pt. I., I.*, 2.)

"For courage mounteth with occasion."
(*King John, II.*, 2.)

". . . Flies an eagle flight, bold and forth on,
Leaving no tract behind."
(*Timon of Athens, I.*, 1.)

"In the clouds, scorning the base degrees
By which he did ascend."
(*Julius Caesar, II.*, 2.)

"To be imprisoned in the viewless winds,
And blown with restless violence round about
The pendant world."
(*Measure for Measure, III.*, 1.)

"Servile to all the skyey influence."
(*Measure for Measure, III.*, 1.)

X. Over the Lines.

"Witness these trenches made by grief and care."
(*Titus Andronicus, III.*, 2.)

XI. The Observer.

". . . His pilot
Of very expert and approved allowance."
(*Othello, II.*, 1.)

"Why, that's my dainty Ariel."
(*Tempest, V.*, 1.)

XII. The Engines Fail.

"And O you mortal engines, whose rude throats
Th' Immortal Jove's dread clamours counterfeit,
Farewell!"
(*Othello, III.*, 3.)

XIII. Hope.

". . . Why may not I
Glide thither in a day?"
(*Cymbeline, III.*, 2.)

XIV. The Last Chance.

". . . Let her down the wind
To prey at fortune."
(*Othello, III.*, 3.)

XV. The Crash.

"Oh, what a fall was there, my countrymen."
(*Julius Caesar, III.*, 2.)

"Sir, sir, thou art so lucky
That we must leave thee to thy sinking."
(*Antony and Cleopatra, III.*, 2.)

"Will this gear ne'er be mended?"
(*Troilus and Cressida, I.*, 1.)

Alec. Macdonald in *Flying* (London).



Courtesy of Flight

The Seven Ages of Man

(By Air-Mechanic W. Shakespeare)

The R.A.F.'s a stage,
And all its *personnel* are merely players;
They have their crashes and calamities,
And each man in his time breaks many parts.
First the fledgling, mewling and puking in the dizzy heights.
Then the first *solos*, with torn and grimy face,
Creeping like snail, ungainly, from the hedge.
Then the subaltern, sighing like furnace,
With woeful ballad penned to the lady driver.
Then the Captain, full of strange jests (somewhat like Wilkie Bard),
Seeking the bubble reputation, even in the Archie's mouth.
Then the Major, too fat to fly, with oak-leaves on his hat,
Bestriding all the place like a Colossus.
Then the C.O. (whose massive coat is interlined)
Sitting in judgment on his cowed Ack Emmas.
Last scene of all, which ends this strange eventful history,
Reveals a General at the Ministry,
Sans eyes, *sans* teeth, *sans* wisdom, and *sans* everything!

G. S. in *Flying* (London).

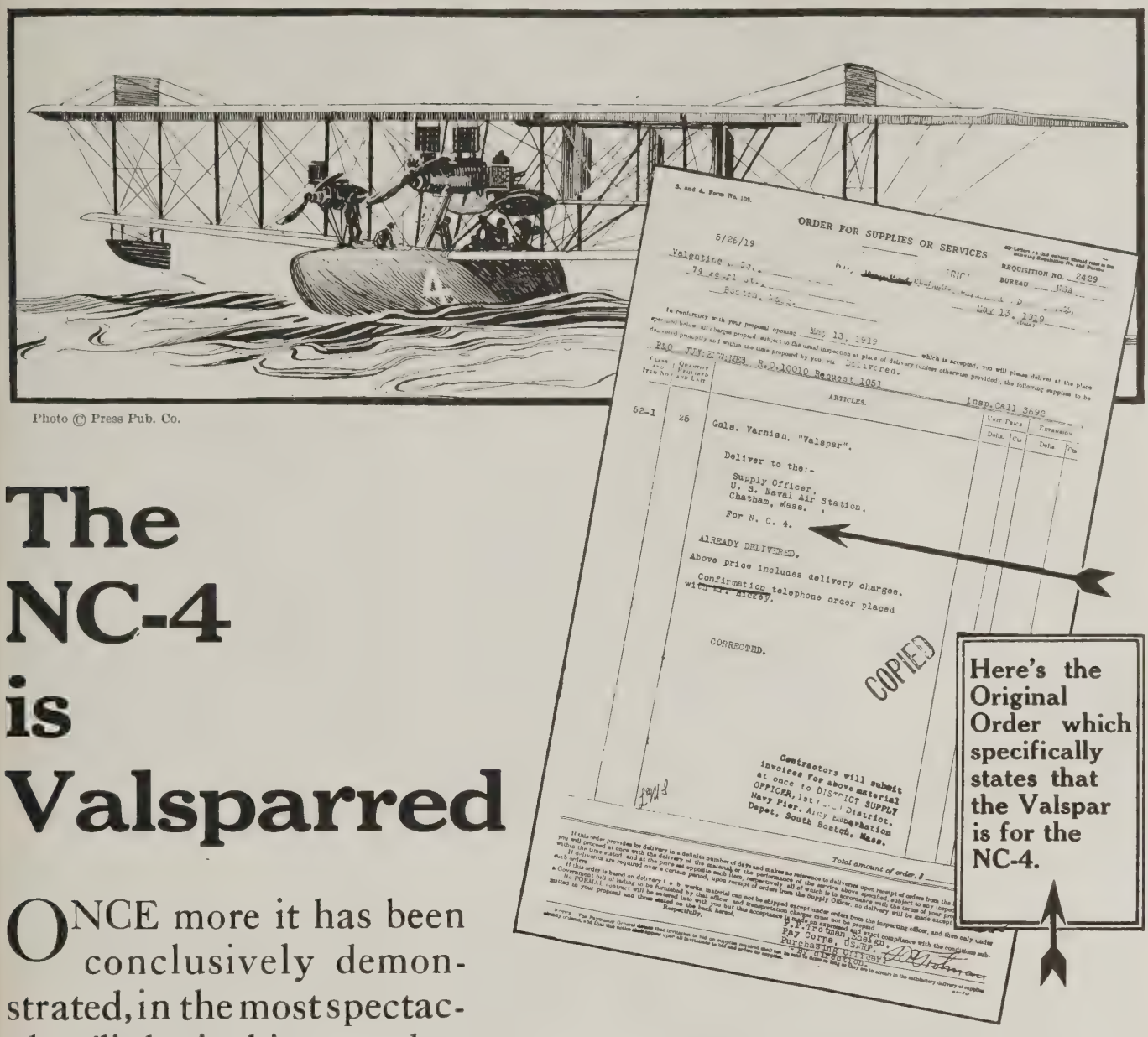


Photo © Press Pub. Co.

The NC-4 is Valsparred

ONCE more it has been conclusively demonstrated, in the most spectacular flight in history, that Valspar is the *supreme* varnish.

The Navy Department varnished the NC-4 with Valspar because of its absolute *waterproofness*, its unequalled *toughness*, and because it possesses the marvelous *elasticity* required to stand the terrific vibration of a seaplane in flight.

Here's the Original Order which specifically states that the Valspar is for the NC-4.

Valentine Products

used by the world's leading airplane makers include:

Valspar Varnish
Valspar Low Visibility Gray Enamel
Valspar Olive-Brown Enamel
Valspar Black Enamel
Valspar Khaki Enamel
Valspar Filler (Wood)
Valspar Primer (Metal)
Valspar Primer (Wood)
Valspar Aluminum Paint
Dipping, Spraying and Brushing coatings of all kinds
Quick-Drying Insignia Colors
Valenite
Valenite Enamels

VALENTINE'S VALSPAR
The Varnish That Won't Turn White

VALENTINE & COMPANY
456 Fourth Avenue, New York
Largest Manufacturers of High-grade Varnishes in the World
ESTABLISHED 1832
New York Boston Chicago VALENTINES (Trade Mark) Toronto London Amsterdam
W. P. FULLER & Co., San Francisco and Principal Pacific Coast Cities

(*Continued from page* 626)

as soon as it is finished will make the most complete and accurate map ever assembled.

"The initial work is now being done from the various flying fields in this country still in operation. Perhaps the most work thus far accomplished is that done at Post Field, Fort Sill, Oklahoma, where a map is now almost completed covering a strip of territory 30 miles wide and 130 miles long. This strip runs from Call Field, at Witchita Falls, Texas, to Oklahoma City, Okla., and is the work of pilots, observers and aerial photographers of the service station at Post Field.

"Most of these pictures were made from a 6,000-foot elevation from De Haviland planes equipped with a Liberty-twelve motor. The men engaged in the work have already taken 650,000 isochromatic plates, and the job has not yet been finished. When this is considered and the fact also that the pictures taken represent a strip of territory of about four square miles and each picture overlaps for about one-half mile so that no bit of ground is left out, and at the same time fits on the enormous ground board on which it is pasted, the size of the job of aerial mapping the entire United States may be realized. It is also at once apparent that the small army of airmen trained during the war period can still be mighty useful to Uncle Sam.

"When a certain section has been pictured and each developed proof been pasted, the whole is photographed and made into a large section map, and as the sections are finished they are in turn put together as were the individual pictures, in the first operation. In order to facilitate the movement of the pilots and photographers, portable hangars have been placed along the route, and the men put in eight hours a day taking pictures. Motor lorries carry dark rooms and development equipment, keeping pace with the pilots so that there is not a lost minute in developing the plates and completing the maps. If the boards on which the proofs are placed were assembled in one line it would be about a mile long and a quarter of a mile wide.

"One of the proofs of the practicability of this method of accurate map-making is the story of the military map made in this manner of the Panama Canal Zone. After a corps of engineers consisting of one regiment had spent six months in attempting to make a map of that zone and met with failure, one squadron of the air service, with twelve ships and pilots and a section of photographers were sent into the region. In two months time they had completely mapped the zone. This map has never been released by the Government because of its great military value.

"Plans have been made by the Director of the Air Service, it has been said at Washington, to map the whole country, but because of the failure of Congress so far to provide for the continuance of the air service on a large scale, the only maps now being made are in the vicinity of the flying fields still operating."

Aeronautic Instrument Development Discussed

Commercial success of the aeroplane can be assured through the use of instruments already perfected. Safety devices that constantly check up the aeroplane during its flight giving the operator a sixth sense and thus enabling him to maintain perfect control at all times and avoid pitfalls to which he would be a victim without their aid of artificial check-up.

These were the conclusions before the Second Pan-American Aeronautic Convention of Charles H. Colvin, M.E., a pioneer in the invention and perfection of aircraft instruments.

"Many pilots do not realize the extent to which they are dependent on their vision or of cloud formations below them, for maintaining the correct attitude of their plane. The only way to appreciate when an aviator is up against flying in a fog, clouds or at night, is to be there with him. Sometimes he cannot see the extremity of the wings of his planes. He cannot tell if he is level, if he is turning—that is, without instruments.

"To realize the seriousness of the stability problem we have but to refer to a recent report of the U. S. Air Service. Out of 274 fatal accidents which were reported, where the cause was known, 178, or 65 per cent. resulted from loss of control due to the plane getting into unstable positions: side-slips, skids, nose dives, stalls and tail-spins.

"For maintaining an aeroplane safely longitudinally, or fore and aft, the most valuable instrument is the air speed indicator or buoyancy meter. The reading of this instrument is a direct indication of the buoyancy or lift of the machine. It does not indicate the correct air speed, however, for at higher altitudes greater speed is necessary to maintain the proper buoyancy. A pilot will learn the buoyancy indication (erroneously indicated as air speed) which corresponds to level flight of his plane for a given engine speed. By noting both his tachometer reading and his indicated air speed he can thus tell very closely if he is descending, climbing, or flying level. Occasional reference to the altimeter will check this. A longitudinal clinometer may also be used in this connection, but is neither as reliable nor as sensitive as the air speed indicator.

"For maintaining his proper lateral attitude a banking indicator is used. This instrument has been practically ignored by the U. S. Army, which probably accounts, in a measure, for the large number of accidents due to loss of control.

"The most successful banking indicator consists of a very sensitive arrangement of pendulums so that a large indication is given for a very slight divergence from the proper lateral position. By keeping the indicator from appearing, the pilot can keep his plane level in flying straight, or properly banked in turning.

"The lateral and directional movements of a plane are closely inter-related. In turning one also banks, and vice versa, therefore we must consider directional stability at the same time as lateral stability.

"If the banking indicator only is used, the pilot may start to turn, and while still flying safe enough, he will get nowhere, going in circles. Here the turn indicator comes to the rescue. This is a small instrument using a gyroscope as a very sensitive indicator of any divergence from straight flight. Thus by keeping his turn indicator neutral—that is, indicating straight flight; and also keeping his banking indicator on center—indicating proper lateral attitude, a pilot can fly straight and level through fog, clouds or darkness.

"As the turn indicator will not show very minute turns, he occasionally checks up his course with the compass.

"It is my belief that stabilizers, particularly of direction, will come into general use and be found highly advantageous on large commercial and mail-carrying planes. In flying a plane from one point to another, fully 75 per cent. of the pilot's energy and attention is devoted to keep the plane on its course. With a directional stabilizer, this is reduced to a negligible part of his duties, as he only needs to look at his compass occasionally to check up the automatic control."

(*Continued from page* 635)

Scott during the explorer's Arctic expedition.

Frederick Wyatt of the Marconi company, who is to be the wireless operator, is now on his way to St. John's on board the steamship Sachem.

A visit to the Handley Page field and an inspection of the machine in the course of being assembled serve to convince one that the promoters of this enterprise aim to eliminate all possible chance, and that nothing of the freakish enters into their designs. At the very start they displayed good judgment in the selection of their field, and the place is regarded as the most suitable for the purpose that could be found in this country. Harbor de Grace, situated on the north side of Conception Bay, is three miles deep and one wide. The headlands of the port jut out into the bay, which is an arm of the Atlantic thirty miles deep and fifteen miles wide. At the entrance of this port on the north side the Handley Page machine is being erected. The field where the work is being done and from which the flier will take off comprises forty acres. It is 900 yards long and 200 yards wide, and has a seaward grade of 3 per cent. The local name of the place is Bear's Cove.

The principal portion of the field is owned by the Roman Catholic Church and was rented to the Handley Page company by Bishop March. In addition, there are more than twenty other owners of portions of the field. Boundary fences, telegraph lines and six farm bulidings, including two dwellings, were removed by the company. The whole field has been levelled and rolled, providing a hard surface. It lies due east and west and the takeoff can be made with the winds from the southwest to northwest and from southeast to northeast.

In the Past!

An ANZANI-ENGINED SINGLE SEATER

First Flew the English Channel



Specifications and Full Particulars

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THOMAS-MORSE

Side-by-Side Seater, Type S-7

Equipped with 80 h. p. Le Rhone Engine.

High speed, 90 M. P. H.

Landing speed, 35 M. P. H.

Climb 6,700 ft. in first ten minutes.

THOMAS-MORSE AIRCRAFT CORPORATION

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Aircraft Materials and Equipment Corporation
1405 *Sedgwick Avenue,*
New York.

(*Continued from page* 639)

Reel Antenna and Accessories

The antenna reel group for this set consists of the reel mechanism, a removable drum with antenna wire and spare drums with complete antennæ on them. The wire from the reel runs through a take-off pulley and passes through the lead-in insulator in the side of the hull of the boat. It then passes through either a strut pulley, or wing pulley, depending upon the type of the boat.

Reel Mechanism

A cast aluminum plate, clamped to one of the main struts in the hull of the boat, carries a shaft on which the drum turns. On this same shaft, next to the attachment plate, there is a brake drum of cast aluminum, and around this drum a cast iron brake band. The band is sprung over the drum and prevents it from turning except when a cam which is attached to the brake lever springs it open. A pin on the brake drum engages holes in the main drum, when the latter is put on the shaft. The crank by which the main drum is turned has a square hub on which the drum sets. It is slipped onto the shaft, and latches in place. The latch is released by a latch handle just behind the arm of the crank. To remove the drum, to put a new one in place, the operator grasps the arm of the crank, and in so doing also grasps the latch handle and releases the latch. He then pulls the crank and drum off together. One drum may then be slipped off the hub of the crank and a new one put on, and the two slipped back onto the shaft.

Reel Drum and Antenna

The drum is a pressed steel spool, black japanned, and will hold about 600 feet of the standard antenna wire. It has a square hole at its center which fits the hub of the crank. The antenna wire has a ball at the reel end, and this ball is dropped through a hole in the drum face. The other end of the wire is attached to a swivel, and this in turn is attached to the "fish" or weight.

Lead-in Insulator

The lead-in insulator is a moulded "electrose" fitting, with a metal tube running through it, and a wide flare at either end, so that the wire cannot catch on the ends of the tube even if it enters at right angles. The insulator is held by lock-nuts in a hole in the side of the hull. The antenna connection from the set is brought to this insulator. When the antenna is out, the ball on the reel end of the wire rests against the inside flare of the insulator. The wire is thus entirely disconnected from the reel, and the reel is dead. When it becomes necessary to reel up, the ball is grasped, and of course brings the wire with it. The ball is passed through the take-off pulley and dropped through the hole in the drum face, and the crank is turned. The brake mechanism is arranged so that the cam may be left holding the brake off during the reeling-up process.

The equipment has given excellent account of itself. For reception, a six-valve vacuum tube receiver is used. In addition, a half-kilowatt spark transmitter driven by a fan was provided. Description of these instruments is not yet permitted by the Navy Department.

OCT 2 9 1919

AERIAL AGE WEEKLY

Vol. 9, No. 14 JUNE 16, 1919 10 CENTS A COPY



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Cricklewood Aerodrome, near London, as viewed by a passenger of the recently inaugurated Handley Page Service

$129,000,000 Asked for Aeronautics

PUBLISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER March 25, 1915, at the Post Office at New York, under the act of March 3rd, 1879

Champion Dependable Spark Plugs

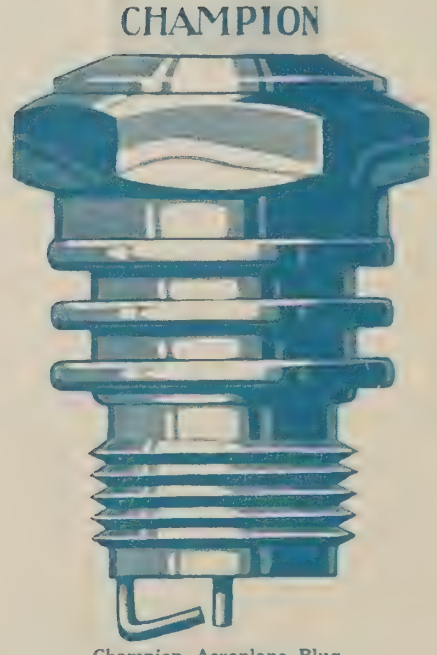


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$129,000,000 ASKED FOR AERONAUTICS

THE Army is asking $83,000,000 for aeronautics, the Navy is asking for $46,000,000.

The General Staff is supporting the plans for a substantial Air Service in the Army just as the General Staff is supporting the plans for a substantial Air Service in the Navy.

Congress seems to be in favor of an extensive program, which shall include a substantial development of the aerial mail service and shall assist the development of civilian aeronautics.

Especially gratifying is the fact that the program includes the acquisition of dirigibles from Great Britain and the construction of dirigibles in the United States.

The details of the Navy aeronautic program, as submitted to Congress, are as follows:

Aircraft for fleet use, $4,504,025.

Purchase abroad of ten special fighting and spotting planes, $200.000.

To erect one large hangar for dirigibles, $1,850,000.

To establish a rigid dirigible construction and operation station, $6,264,000.

To construct two rigid dirigibles, $400,000.

To purchase a British rigid dirigible, $2,500,000.

Conversion of collier Jupiter as aeroplane carrier, $500,000.

To purchase and convert two merchant vessels into aircraft tenders, one for planes and one for lighter than aircraft, $5,261,250.

To continue operations of all established air stations, $7,813,107.

To continue experiments and developments of all types, $9,405,000.

To equip Marine Corps advanced base units with aircraft, $3,933,100.

Miscellaneous, $300,000.

Total, $46,531,482.

It is considered significant of what the future trend of aircraft development is to be that the Navy is already asking that almost half of its appropriation shall be for dirigibles.

PREPARATIONS FOR TRANSATLANTIC FLIGHTS AT ATLANTIC CITY AIRPORT

PREPARATIONS are being made at the Atlantic City Airport for a number of projects for non-stop trans-Atlantic flights, starting from or ending at the Airport. It is understood that the projects for non-stop trans-Atlantic flights include two British, two Italian and three American plans. Three of the projects contemplate the use of huge dirigibles, and four the use of land aeroplanes and seaplanes.

Representatives of the Aerial League of America and the Aero Club of Atlantic City and prominent American Aces and naval aviators and wealthy sportsmen and business men have held a number of conferences with engineers, hangar builders and makers of hydrogen and plans are being drawn for large hangars for trans-Atlantic seaplanes and land aeroplanes and for hydrogen plans for dirigibles.

The advocates of land aeroplanes are making headway with their arguments that the large land aeroplanes equipped with multiple power plants will prove to be most efficient for trans-Atlantic flights, as they will permit starting from the Airport here and landing at the aviation fields in England, France and Italy, or vice versa.

Towers sixty-five feet high have been built to mark the ten-miles course for testing the speed of the trans-Atlantic flyers. This course is so arranged that both seaplanes and land aeroplanes can make their tests and in case of a forced landing can land on water or on land, whichever may be the most desirable.

Plans are under consideration for the construction of seaplane hangars at the extreme end of the Airport, facing the Great Thorofare which affords over ten miles of calm, protected water where tests can be conducted. Rough water tests will be conducted at the Inlet and over the ocean.

A trans-Atlantic Flight Record Hall is being established at the Airport Administration Building, where airmen will find all the charts and data available and needed for trans-Atlantic flights. This data already include numerous charts showing all the possible routes for flying across the Atlantic, the meteorologic charts and reports of meteorologic conditions to be met in crossing the Atlantic on different months of the year; instruments for aerial navigation, photographs of all the NC seaplanes, as well as the British trans-Atlantic type planes.

Mr. A. S. Abell, 3rd, is the Secretary of the Committee in charge of the trans-Atlantic flight data.

Seven hundred thousand cubic feet of hydrogen has been mobilized in different parts of the United States during the past month to be used to fill up the British dirigible R-34, which is due to come to the United States this month and is scheduled to land at the Atlantic City Airport, which affords the best unobstructed landing place in this part of the country.

An indication of the fact that permanency is contemplated was given a few days ago when Messrs. Albert T. Bell and Harry B. Cook, President and Secretary of the Atlantic City Aero Club, respectively, and Mr. W. W. Young, the noted engineer, sought to purchase two hydrogen plants from a Philadelphia firm, in addition to mobilizing over half a million cubic feet of hydrogen in steel bottles. Each of these two plants would be capable of producing ten thousand cubic feet of hydrogen an hour, therefore could supply in a short time the amount of hydrogen needed to replace the loss which a two million cubic feet dirigible would sustain in crossing the Atlantic. These plants cannot be had without permission from the War Department and a representative has been sent to Washington to secure the official release.

Invite NC-4 to Atlantic City

Secretary of the Navy Josephus Daniels was invited to send transatlantic flyer NC-4 to the Atlantic City Airport to be placed on public exhibition there in order that the hundreds of thousands of people who come from all parts of the country might be able to see it. Officials of the aero clubs are convinced that Atlantic City, because of its ever-changing population, would afford opportunity to more different people to see the famous ocean-tripper than any other place in the country and that it would prove one of the greatest boosts for aviation that could be placed before the public.

Albert T. Bell, president of the Aero Club of Atlantic City, and Samuel P. Leeds, president of the Atlantic City Chamber of Commerce, who are closely cooperating with the Aero Club of America; the Aerial League of America and the sixty-two clubs affiliated with these organizations, have extended the invitation.

Mr. Bell, in the invitation, pointed out that the Atlantic City Airport is the first and only airport in the world and one that affords exceptional facilities for land and water planes. The airport is located within a few minutes' walk of the heart of the city and 3,000 feet from the Boardwalk, and therefore easily accessible to the public. Emphasis is laid on the fact that the Atlantic City Airport is the only place where the NC-4 can be flown to and exhibited without danger of breakage through transportation, because the Thorofare waters, which form the water course of the airport, are protected and still at all times and ideally suited for large seaplanes both for take-offs and docking.

Stress is also placed upon the fact that ten million people who come to Atlantic City each year represent more territory than any similar number of persons visiting any single city in the world, who would sooner come to Atlantic City during the summer months than any other place. It is estimated that close to a million and a half people will visit Atlantic City during July alone.

The large size of the NC-4 makes it almost impossible to exhibit it anywhere else than at a naval station, where there are no facilities for accommodating the large crowds. This can easily be done at the Atlantic City Airport, and in addition there are hotel facilities to take care of any crowds that may make the trip to see the ship.

Mr. Bell also extends, through Secretary Daniels, a hearty invitation to Commander Read, Lieutenant Stone and the other members of the NC-4 crew to come to Atlantic City "to be presented to the million people representing every State and city in the United States."

Diploma Presented to Commander Read

Announcement was made of the award of the Diploma of Honor of the Aerial League of America to Commander A. C. Read, the hero of the transatlantic flight; Flight Lieutenant Stone and the other members of the crew of the NC-4, and Commander R. E. Byrd, who invented the Byrd sextant, by the Awards Committee of the Second Pan-American Aeronautic Convention.

Other prominent officers of the United States Army and Navy were awarded the League's diploma, including Major-General Mason M. Patrick, who was chief of the U. S. Air Service overseas during the war, now the U. S. Army representative on the Aeronautical Commission of the Peace Conference; Rear-Admiral D. S. Knapp, U. S. Navy representative on the Aeronautical Commission of the Peace Conference; Brig.-Gen. Theodore C. Lyster and Lt.-Col. I. H. Jones, who were foremost in organizing the Air Medical Service; Col. Halsey Dunwoods, executive officer of the U. S. Air Service overseas; Col. E. Lester Jones, Col. Charles Elliott Warren, Col. B. J. Arnold, Col. Thurman W. Bane, Col. C. G. Edgar, for exceptional services rendered to the United States during the war; Col. C. C. Culver, who developed the radio telephone; Lt.-Col. A. R. Chrustie, Lt.-Col. W. G. Kilmer, for exceptional efficiency while in charge of the U. S. Army Aviation centers in France; Col. Charles De F. Chandler and Col. Frank P. Lahm, for exceptional efficiency while in charge of the U. S. Army Balloon Service in France; Maj. J. C. McCoy, Maj. Thomas S. Baldwin and A. Lee Stevens, for exceptional efficiency in organizing the U. S. Army Balloon Service; Capt. Charles J. Glidden, for exceptional services rendered in recruiting for the U. S. Army Air Service; Maj. John M. Satterfield, for exceptional efficiency in connection with the administration of the Air Service in France during the war.

The Awards Committee had under consideration awards to 100 other high officers of the U. S. Army, Navy and Marine Corps Air Service.

Commercial Aviation Discussed

The future of commercial aviation is six miles above the earth's surface. The birdmen must get above the storm limits—weather must be eliminated from the commercial aerial log. The "altiplane," the antithesis of the submarine, will turn the trick.

These were salient points in the address before the second Pan-American Aeronautic Congress by Samuel D. Mott, M. E., an Edison pioneer, charter member of the Aero Club of America, who has just completed a special study of aeronautics with the view of future attainment:

"We have read of many men tarrying at Newfoundland for several weeks waiting—waiting for the weather. That trial was a glorious undertaking, our navy's expedient was wise, and all honor to the brave men attempting the test. But I submit that waiting indefinitely for ideal weather conditions for long-distance flying over land or sea will not do for the demands of commerce. Therefore, by the process of reasoning that Holland applied to boats to go out of sight beneath the stilled waters of the ocean, I conceive and would bring to your attention the possibilities of the antithesis of the submarine—the altitude plane, or altiplane, as distinguished from the aeroplane or hydroplane, to go into the stillness of nature above the weather.

"The problem is evidently one of equipment of our planes to function in rarefied air, and protection of navigators against its tenuity; likewise protection of their body warmth and comfort in extremes of temperature. How high we may go no one may know until tested. Personally, I believe it possible to go 15 or 20 miles aloft, if necessary. It is obviously a matter of equipment plus climbing ability of aircraft designed for the purpose.

"What is the object of high flying? Daily experience shows us that high speed and density are incompatible. We know that the surface speed of submarines is about half that of battleships; submerged, it is less, and the greater the depth still less the speed, due, in the first instance, to displacement, which is constant, and in the second place to increasing density, which is progressive. Again we know this when we furnish aircraft with four times the power to go twice as fast, or as we say, the square of the velocity; and the marine engineer knows when he furnishes eight times the power to go twice as fast, or as we say, the cube of the velocity. How well this is illustrated with our swift motorboats designed to run as high out of water as is consistent with stability, and when planes are used their hulls are entirely out of water and in the lighter air above, and when so disposed the highest aquatic speed has been attained. In other words, from the ultimate height of the air to the earth's core pressure is progressive. Thirty-three feet below the ocean's surface the pressure doubles. For every 1,000 feet ascent the pressure diminishes roughly one half pound per square inch. The pressure at two miles high is 9.8 per square inch, at one mile high 10.88, at three-quarters of a mile 12.06, one-half mile 13.33, one-quarter mile 14.2, and at sea level 14.7 pounds, or, in round numbers, 15 pounds per square inch.

"Where is the storm limit? As moisture and varying temperature is the fundamental of storms, their greatest development is near the surface and wholly confined to the storm limit. Wind strata is of varying temperature. Over the hottest regions of Africa zero conditions have been detected within 1,500 feet of the ground.

"Why must there be a storm limit? Because storms and hurricanes do not exist without moisture and heat, and air must have a certain density to hold the moisture due to evaporation. Hence there can be little or no wind above the storm limit.

"The unknown factor in the high-altitude problem is this—will an alti-plane in one-fifth density (eight miles high) with equal push go five times faster or one-fifth faster? The rest is a matter of simple equipment and good construction. In either case the gain is substantial. If the former were true, a voyage between New York and London can be made in around three hours by going eight miles high. If the latter is true the same voyage can be made in about twelve hours' running time, assuming a surface speed of 200 miles per hour, which is practically a question of power.

"In the exhibition in Aeronautical Hall is an engine which explains why we are flying to-day, and why we will fly faster to-morrow. It is a 400 H.P. Curtiss engine weighing 1.7 pounds per H.P. and has driven an aeroplane 160 miles per hour.

"To my mind, it is plain that high altitude will be a determining factor in long-distance flying. This is true for the endurance of the human machine, and limit of life of the power machine—the motor. Greater speed, greater distance, more comfort and less danger—less danger in the quiet environment, less danger because when we double the time to do a risky thing we double the risk incurred. Less gasoline, less weight and expense, for if environment permits to go 100 miles with twice the fuel we formerly used to go 25 miles our economic gain is obviously 100 per cent. because we may then go 100 miles with the amount of fuel we formerly consumed to go 50 miles."



The News of the Week



Martin Bomber to Attempt Transcontinental Flight This Week

The Martin bomber for the transcontinental flight is being tuned up for the trip, which, it is estimated, will take 32 flying hours for the 2,750 miles. Captain Roy N. Francis, who is said to have had more hours of flying than any other aviator in the Army Air Service, expects to make only one stop at North Platte, Nebraska, 1,502 miles from the starting point.

He will start from Mineola at 3:30 o'clock in the morning. His time over the principal cities on the way, with variations necessary for the wind, will be: New York, 3:37 o'clock; Cleveland, Ohio, 7.42; Toledo, 8:55; Chicago, 11:42; Des Moines, Iowa, 3:45 p.m.; Omaha, Neb., 5:11; North Platte, 8:09. The next morning, the machine will take the air at 3:30 o'clock. It will pass Cheyenne, Wyo., at 6:07; Salt Lake City, Utah, 10:55; Reno, Nevada, 3:37 p.m., and will arrive at San Francisco at 5:58 o'clock in the evening.

The machine will be the typical bombing plane which was ordered during the war for service at the front. The only modification will be that the armament will be left off and the tunnel leading from the pilot's seat to the cockpit will be utilized for gasoline tanks. The aeroplane will weigh, over all, 10,600 pounds. It will have a 71-foot wing spread, and will be driven by two 400-horsepower Liberty motors. The plane is fitted with radio telephone equipment and a radio compass.

Daily Air Taxi Service Between Boston and Shore Resorts

Boston, June 6.—The first aerial taxi service in New England of the country is being operated by the North Shore Aerial Transportation Company of Swampscott from Swampscott to Franklin Field, Boston.

The first trip, a nine minute ride by air, was taken by Mrs. Frank Wright of the Todesco Country Club, Swampscott. Advertising was dropped from the air on the trip and merchandise was taken back to Swampscott.

The company plans to make daily flights between Boston and North Shore summer resorts on express, passenger carrying and advertising business. The proposed taxi schedule of the company shows the running time to be nine minutes from Boston to Swampscott, eighteen minutes from Boston to Magnolia, and thirty-seven minutes from Boston to Portsmouth, N. H.

$50,000 in Prizes for Los Angeles-Australia Flight

Venice, Cal., June 5.—An offer of $50,000 as prizes for aviators who will attempt a flight from Los Angeles to Australia was made by Thomas H. Ince, motion picture producer. To the first man to land on Australian soil, $35,000 will be paid, according to the announcement. To the first aviator attempting the flight, who although failing to reach Australia, reaches the Hawaiian Islands, $10,000 will be paid. In the event none of those attempting the flight reaches the Hawaiian Islands, $5,000 will be paid to the one making the best showing.

Chicago Clothing Manufacturer Uses Aerial Delivery Service Over 500 Mile Radius

Chicago, Ill.—A Chicago maker of a nationally advertised brand of men's clothing announced organization of an aeroplane delivery to serve dealers within a radius of 500 miles.

At the end of the first week of selling, an automobile dealer who has added aeroplanes to his stock Saturday said that he had sold Canadian Curtiss forty planes.

Aerial Forest Patrol Discovers Its First Fire

Washington, D. C.—The War Department announced that Lieut. Donald C. Cathcart, the Post Adjutant at Ross Field (Arcadia, Cal.), discovered at 2.10 o'clock P. M. on June 6 the first fire in co-operation with the forest service from an observation balloon at an elevation of 1,500 feet, on the Lucky Baldwin ranch at the foot of Sierra Madre Mountain. Within seven minutes after the fire was located enlisted men in a special fire truck had arrived. They extinguished it after two carloads of barley hay had been destroyed. Orders were given and owners of property notified from the balloon basket by telephone.

The aeroplane patrol of Cleveland National Forest, one of the Curtiss JN-4 pattern, covered 115 miles in ninety minutes at an altitude of 3,000 feet.

The forest patrol planes are equipped with wireless and in communication with permanent stations. Good emergency landings have been provided.

The first patrol was successful. It was piloted by Lieut. J. L. Fogarty with Sergt. (first class) H. E. Wari, observer

Naval Airmen to Guide Gloucester Fishermen By Radio to Schools of Fish

Washington, D. C.—The Naval Air Service is ready to co-operate with New England fishermen whose craft are fitted with radio, according to a Washington dispatch. It is believed that this innovation will result in a considerable saving of time and expense as it will permit the fishermen to complete their catch with minimum cruising.

If the service proves successful, steps will be taken to extend it on all coasts.



The famous 94th Pursuit Squadron returns. From left to right: Capt. Sam Kaye, Lieut. R. W. Donaldson, Lieut. R. Z. Kates, Lieut. K. R. Jackson, Lieut. C. A. Rankin, Major R. M. Chambers, Lieut. D. R. Mackenzie, Lieut. A. W. Markhan, Lieut. K. E. Hopkin and Capt. W. W. Palmer

Atlantic City Airport Preparing to Receive the R-34

Atlantic City, N. J., June 8.—Announcement was made at the Atlantic City Airport today that seven no-stop transatlantic air flights will be made soon with this port as objective and "take off," respectively. The flights will be made by American, British and Italian airmen. Two and probably more will start from this port. Preparations will begin immediately for the events. Three dirigibles are included in the program. It was said that full particulars of the enterprise will be forthcoming in a few days.

Confident that the British dirigible R-34, which may begin her flight for America tomorrow, will make this city her objective, the Aero Club officials are making preparations to receive the giant "blimp." The arrangements include construction of a hydrogen plant with a capacity of 10,000 cubic feet of gas an hour in order to reinflate the dirigible. It is understood 700,000 cubic feet of hydrogen in various parts of the country will be available in case it should become necessary to call for outside assistance.

A. S. Abel, 3rd, of Baltimore, has been appointed secretary of a committee to gather transatlantic flying data.

It is the intention here to lay a ten-mile course over which sea and land planes may try out their engines during the tuning up prior to transatlantic flights.

Aeronautic Medical Apparatus to be Exhibited

At the annual meeting of the American Medical Association, to be held in Atlantic City, N. J., June 9-13, technical apparatus in use at Medical Research Laboratory, Mineola, is to be exhibited.

Papers are to be delivered on aeronautic medicine, here and abroad; films "Fit to Fly" are to be shown, and there is to be an assembly of medical men who have served at some time with the Air Service.

Aeroplane Courses Popular at City College

New York, N. Y.—Evening courses on aeroplanes and aviation engines at the College of the City of New York having met a popular demand, the authorities have decided to repeat these classes during the Summer Session commencing July first.

The enrollment in the aeronautics classes at the College during the present year has been 586 students. The laboratory equipment used in the instruction includes aeroplanes and motors donated by manufacturers and valued at $100,000.

The Summer Course, which is open to the public, will last eight weeks, and will include both lectures and laboratory practice. Those who are interested may secure further information by writing or calling at the College.

Speedy Flights by Air Service Planes

Washington, D. C.—The Air Service in official announcement reveals the following fast flights during the last week:

Handley Page aeroplane, carrying ten officers and men in charge, Capt. Clyde C. Dunnington made flight New Orleans to Houston, Texas, 362 miles, 245 minutes, completing flight from New Jersey, on June 2. The total flying time from Elizabeth, N. J., to Houston, Texas, was 1,298,-minutes, a distance of 1,525 miles.

Lieut. Gordon St. Clair, A.S.A., with a mechanician, arrived at Center City, Minn., in De Haviland from Rantoul, Ill. Flying time 387 minutes, distance 572 miles.

At a maximum elevation of 5,000 feet in a De Haviland 9-A bombing and machine-gun aeroplane, Lieut. Charles W. Miller pilot, passenger Lieut. Clifford B. Johnstone, made a non-stop flight, Dayton, Ohio, to Washington, 395 miles, in 275 minutes.

A De Haviland, driven by Lieut. W. C. Layne covered a flight to Harrisburg, Sanelon and return—54 miles, in 27 minutes.

Captain Louis E. Appleby, commanding the fliers covering Arizona on general recruiting, carried in his aeroplane from the people of Imperial Valley, California, to the Governor of Arizona a crate of cantaloupes—distance 260 miles, time 200 minutes.



Two views of the single seater "Ace" Biplane, with a 4 cylinder 40 H.P. engine, built by the Aircraft Engineering Corporation

The "Ace" Single Seater

In a recent test of the "Ace" Biplane, Pilot Bruce Eytinge, the test pilot for the Aircraft Engineering Corporation took off in less than 80 feet. He climbed to 2,500 feet in 8 minutes, and after putting the "Ace" through stunts, spiralled down and landed in less than 60 feet. The demonstration of the short stop was to give evidence of the machine's complete adaptability to small landing fields.

Pilot Eytinge is constantly "up in the air" testing and demonstrating new machines as they are turned out by the factory. The Aircraft Engineering Corporation builds both the plane and the engine, which is a four-cylinder, vertical, water-cooled, 40-H.P. engine.

Climbing tests were made on June 8th in a wind which was estimated at from 35 to 40 miles an hour. No other machines ventured aloft, but the "Ace" performed remarkably. In 20 minutes the machine climbed to an altitude of 6,000 feet. The altitude was indicated by a standard Taylor altimeter. To show its weight-carrying capacity, a test load of 180 pounds of sand was carried. In view of the fact that the machine was a single seater this reserve lift speaks well for the general efficiency of the design. Later, tests are to be made carrying a passenger, when slight modifications will be made in the seating arrangement.

In the high wind almost every aerial manoeuvre was carried out, showing the machine to be well under control at all times. With the machine headed directly into the wind the pilot could, by manoeuvring the elevators, cause the machine to slowly lift straight up or descend vertically. By throttling the engine the machine was made to remain almost stationary in the air. Upon alighting the machine came to a complete rest after a short run, which, upon being measured, was found to have been only 30 feet.

Two Air Service officers, Lieut. E. J. Spencer and Lieut. D. C. Smith, made short flights of 10 minutes each in the "Ace" to try out for themselves the stunts they had watched Pilot Eytinge perform.

London and Paris Greet Trans-Atlantic Fliers

The members of the crew of the successful NC-4 have been greeted as heroes by the cordial and generous French and British populaces. On June 5, in London, Lieutenant Commander Albert C. Read and the crew of the American seaplane NC-4, which made the successful transatlantic flight, as well as Commander J. W. Towers and the others who handled the NC 'planes, were guests at a luncheon given by Major General Seely, under secretary for air, in the House of Commons.

The luncheon was given to permit discussion of the future of British aviation. The Prince of Wales, Lord Birkenhead, the Lord High Chancellor; James W. Lowther, speaker of the House of Commons; the Earl of Reading, former ambassador to the United States; Winston Spencer Churchill, Secretary for War, and Field Marshal Sir Douglas Haig, were present.

General Seely, in proposing the health of Lieutenant Commander Read, assured him and the other Americans that "there is no trace of envy on our part for your splendid performance."

Lieutenant Commander Read in responding said:

"We want to thank you for the wonderful welcome you have given us to London. I am glad to see Commander Grieve here, and am sure Hawker would be here but for indisposition resulting from the great reception he has had.

"Our success was due to careful planning and preparations made. Flying across was the easiest part of the proposition."

The Prince of Wales in responding previously to a toast to his health, said:

"I wish to congratulate heartily Commander Read and his associates who were first to fly the Atlantic."

It was announced at the luncheon that British lighthouses soon will be fitted out to throw vertical beams to assist airmen.

The aviators had returned to London on the day previous to the banquet from Paris, where they had been in conference with Admiral William S. Benson, chief of naval operations, presumably on the transatlantic flight. Rear Admiral Plunkett, who arranged the destroyer guides from Rockaway to Plymouth, accompanied Commander Towers, Lieutenant Commanders Read and Bellinger to the Paris Conference of June 3. The party was entertained at luncheon by the American Naval Headquarters Staff.

Vickers, Vimy and Handley Page Soon Ready for Trans-Atlantic Flight

St. John's, N. F.—The news that the British dirigible R-34 may leave from England for Newfoundland within a fortnight has caused a general speeding up of work here among the transatlantic aviators. The rain which is falling almost continuously is hampering them so much, however, that the R-34 may arrive before they start.

The discovery by Captain Jack Alcott, the Vimy pilot, of a good flying field in Ropewalk, a suburb of St. Johns, was hailed with delight here by all pilots. No other entrant has a really good field, so Raynham, of the Martinsyde, as well as the Alliance and Boulton and Paul parties may use the new field. Work of clearing out rocks and other matter dangerous for aeroplanes started on June 2, but this field, too, is so sodden it is unlikely any flight can be made within ten days.

Lieutenant Arthur W. Brown, navigator of the Vickers-Vimy bomber, now preparing here for the transatlantic flight, has received word from Lieutenant Commander R. E. Byrd, U. S. N., that the Navy Department has shipped to him one of the bubble sextants designed by Liutenant Commander Byrd for the American seaplanes.

These sextants have been the envy of all the navigators who have seen them, and Lieutenant Brown expressed himself as greatly delighted and keenly appreciative of the navy's willingness to help him by lending the instrument.

The assembling has progressed so far that engine tests have begun and news of test flights is expected daily.

Wireless messages from German and Italian land stations nearly 4,000 miles away were picked up by the Hadley-Page biplane which is being assembled at Harbor Grace for a transatlantic flight. A flight in the huge Handley-Page machine to St. John's from Harbor Grace, with Vice-Admiral Mark Kerr as pilot, will be made within a few days.

Lieutenant Commander Mackenzie Grieve has refused Raynham's offer to act as navigator for the Martinsyde biplane.

Plans for Syracuse Aerodrome Under Way

Syracuse, N. Y.—The incorporation of an organization of Syracuse business men to be known as the Onondaga Aerodrome Corporation, to be capitalized at $15,000, will probably be effected at the office of the secretary of state in Albany this week. The concern will interest itself in the construction, operation and sale of aeroplanes and lighter than air machines and will be the first of its kind to take up an aerial program in Central New York on a business scale. Mr. Byron M. Burns, a local insurance dealer, is one of the several leading Syracuse business men interested in the new venture.

Everett Hazelton is Flying Magazine's Advertising Manager

Everett L. Hazelton, formerly western advertising manager of *The Outlook*, has assumed the position of advertising manager of *Flying*. Mr. Hazelton was an ensign in naval aviation in overseas service and he is thoroughly familiar with the technical phases of aeronautics. He also brings to his new position a practical knowledge of advertising and a definite enthusiasm for the present and future of aeronautics.

New Training and Exhibition Field Near Boston

Boston, Mass.—C. E. West, who is selling used Curtiss planes in Boston, has leased a large piece of land at Boxford, near Boston. Large hangars are to be constructed for the accommodation of his wares. He is expecting to have ten planes delivered by June 15.

Captain James Disappears in Cross Country Flight

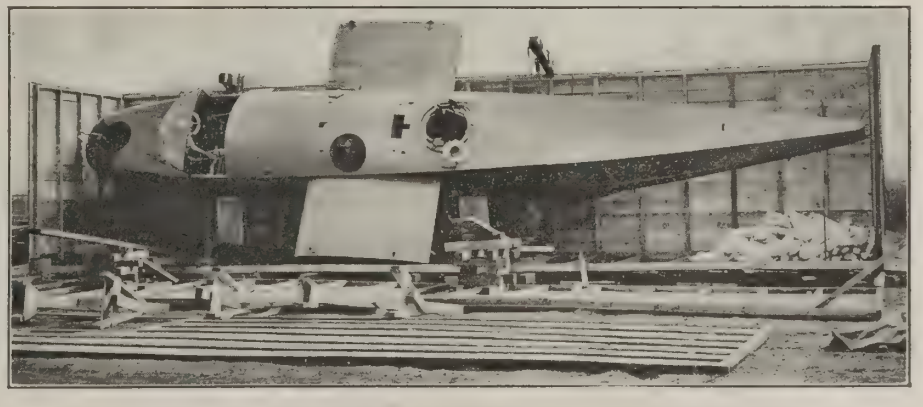
New York, N. Y.—Captain Mansell R. James, British Ace, who left Boston for Atlantic City on May 29, has not been found. Rewards totalling $1,000 are offered for information leading to the finding of Captain James by Dr. James and members of the Aero Club of America.

An aerial search and extensive telephone inquiry have failed to reveal any conclusive information. Captain James was attempting to win the $1,000 Boston *Globe* flight offered in connection with the Second Pan-American Aeronautic Convention.

Augustus Post Addresses Second Pan-American Commercial Congress on Aerial Commerce

Washington, D. C.—The possibilities of the aeroplane in developing commerce throughout Latin America was one of the topics of the day that aroused most interest. Augustus Post, Secretary of the Aero Club of America, declared that "commercial aviation has started by leaps and bounds to exceed the tremendous development made during the time of war which put aeronautics 20 years ahead of what it would have been without this extraordinary necessity and stimulus to inventive genius." He pointed particularly to the strides of the past few months in flying across the Atlantic, and announced that the United States Army, not to be outdone by the Navy, is planning a transcontinental flight from the Atlantic to the Pacific, flying 1,500 miles without a stop before crossing the Rocky Mountains. Captain Charles J. Glidden and Captain Creston M. L. McCullough, of the U. S. Army Air Service, also spoke, the latter declaring that there would be much more activity in the future in aircraft interest in South America, and that the countries of Latin America could depend on the United States instead of Europe for their instructors and machinery.

Mr. Post spoke of actual plans now under way by the United States Post Office Department and by private concerns looking to the establishment of aerial mail routes between the United States and Cuba and the other countries to the south.



An H-16 Fying Boat hull being crated for shipment at the Curtiss plant, Garden City, L. I.

THE CURTISS MODEL 18-B BIPLANE

AFTER the successful trials of the Curtiss Model 18-T triplane, the two-seater 18-B biplane was brought out by the Curtiss Engineering Corporation. The biplane is built around the same fuselage and power plant as the triplane, but having a lesser overall height the gunner has a wider arc of fire.

The housing of the engine is particularly neat; it is entirely encased with the exception of the exhaust stacks, which are streamlined. The removable cowling around the engine makes the power plant accessible for adjustments and repairs.

As in the triplane, all interplane cables are of true streamline. Where cables cross, they are clamped together by streamlined blocks.

Another peculiarity of this machine is the employment of ailerons on the lower plane only. These ailerons are operated by steel tubes running through the lower plane and directly connected to the pilot's control stick. This principle entirely eliminates all outside control cables and rigging.

Rudder and elevators are operated by levers enclosed in the fuselage termination thereby doing away with all outside control cables. There are no external braces for the stabilizer or fin.

General Dimensions

Span, upper plane	37′— 5¾″
Span, lower plane	37′— 5¾″
Length overall	23′— 4″
Height overall	8′—10½″
Chord, upper plane	0′—54″
Chord, lower plane	0′—48″
Stagger	0′—16½″
Gap between planes	5′— 0″

Weights

	(*Lbs.*)
Weight fully loaded	3,001
Useful load	1,013

Performances

(Altitude)

	(*Feet*)
Service ceiling	22,000
Maximum ceiling	23,750
Climb in 10 minutes	12,500
Climb in 10 minutes (light flying load)	16,000

(Speed)

Altitude	*Sea level*	*5,000 feet*	*10,000 feet*	*15,000 feet*	*20,000 feet*
High speed (m.p.h)	160.5	158.5	157.5	155	152
Low speed (m.p.h.)	59	68.2	73.6	79.8	86
Economical Speed	80	85	92	100	118

(Climb)

Rate of climb (ft. per minute)	2390	1690	1040	580	210
Time of climb (minutes)	0	2.5	6.3	12.9	27

(Endurance)

	(*Miles*)	(*Hours*)
High speed (sea level)	283	1.75
Economical speed (sea level)	536	6.7

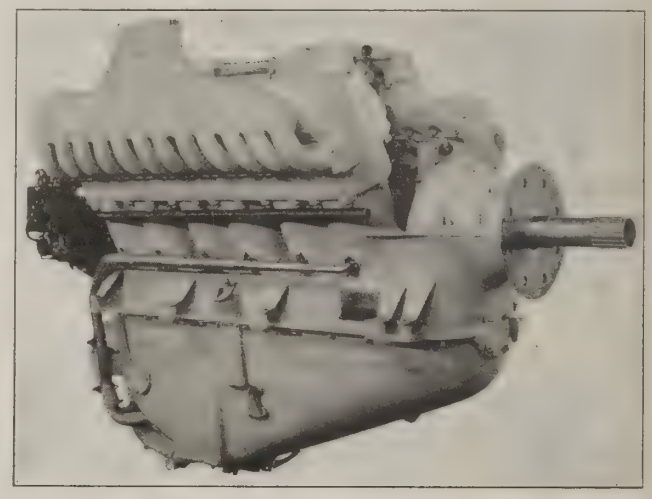
Main Planes

Planes are in flat span. There is no dihedral or sweepback.

Main planes are in five sections. Center section over the body 30″ wide. Outer sections 17′ 5⅞″ in span. Overall span 37′ 5¾″. Lower plane in two sections at either side of the body, each 17′ 5⅞″ in span.

As indicated on the accompanying line drawing, the ribs are spaced about 6″ apart. Instead of the usual two main wing beams, the Model 18-B employs five main wing beams, the idea being to more evenly distribute the loading on them.

The chord of the upper plane is 54″. Forward main wing beam located 9″ from leading edge. Wing beam over the rear fuselage and interplane struts 2′ 9″ from leading edge.



The Curtiss Model K-12 400 h.p. aircraft engine

Chord of lower plane 48″. Forward main wing beam 9″ from leading edge. From this the other main wing beam members are spaced 7 5/16″ apart.

Ailerons on the lower plane have a very high aspect ratio, being 13′ 5 1/16″ in length and 10¾″ wide.

Struts over the fuselage are spaced 30″ apart. From these the intermediate interplane struts are centered 6′ 1½″. From intermediate struts, outer struts are centered 7′ 8½″. This leaves an overhang of 43⅞″.

Fuselage

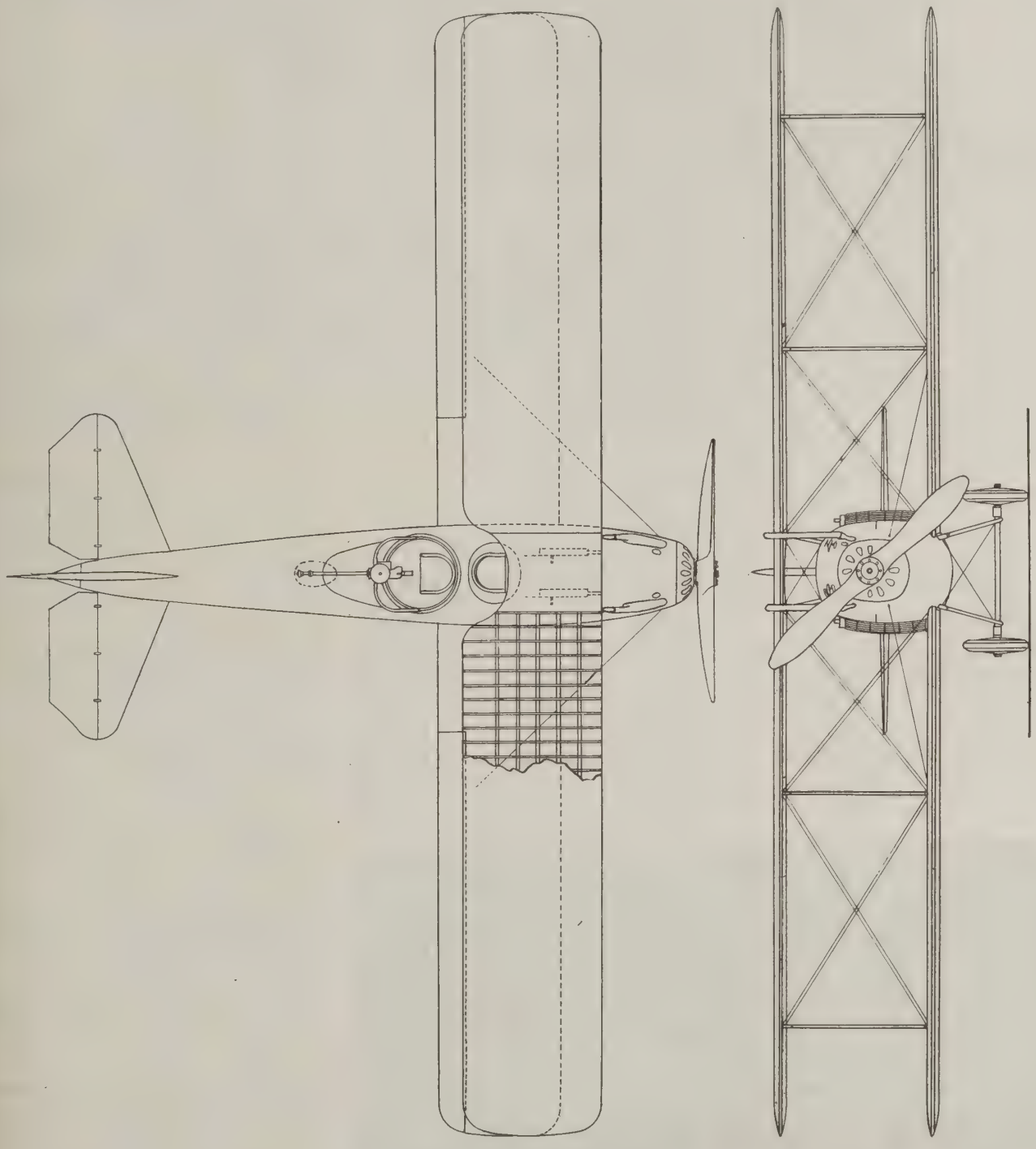
The fuselage is of monocoque construction, finely streamlined. Overall length, 21 feet.

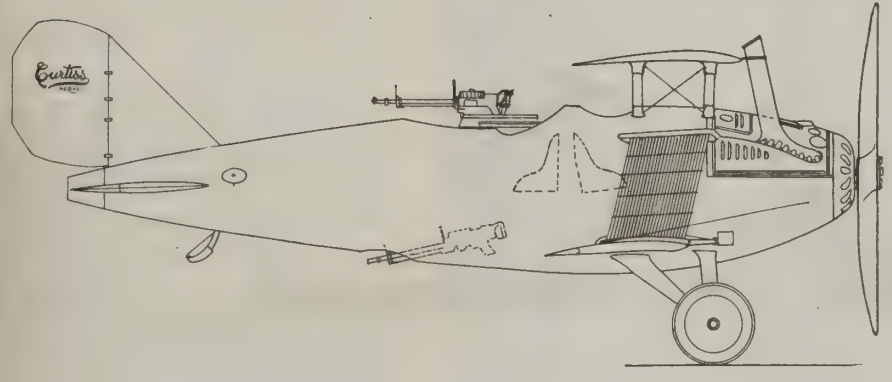
Pilot's cockpit is below the trailing edge of upper plane. Aft of the pilot, the gunner's compartment is arranged so that the gunner has a wide range of fire for the two Lewis machine guns, one of which is located on a rotatable Scarff

(*Continued on page* 701)



The 400 h.p. Curtiss Model 18-B biplane, called the "Hornet"





CURTISS MODEL 18-B
400 HP CURTISS K-12 ENGINE
BATTLEPLANE

McLaughlin

LYNITE LABORATORIES OF THE ALUMINUM CASTINGS COMPANY EMBODY MOST PROGRESSIVE IDEAS AND UP-TO-DATE EQUIPMENT IN THE FIELD OF INDUSTRIAL RESEARCH

THE close affinity between the aeroplane industry and the aluminum casting industry has been clearly demonstrated in the critical period through which our country has just passed. The contribution, for instance, of the aluminum castings industry to the Liberty Engine is quite generally known. Our leading aeronautical engineers are beginning to realize that the remarkable growth of the "youngest industry" has in a large measure been dependent upon the recent phenomenal advance in the arts of alloying and fabricating non-ferrous metals, and in particular, aluminum with copper and zinc. It is therefore of apparent interest to aeroplane builders to assure themselves that the aluminum castings industry of the United States is not only doing some real constructive work which will enable it to keep pace with the present demands of aeroplane manufacture, but also is fully prepared to meet the certain further expansion of aerial activities.

In order to meet the increased demand for better aluminum alloys as materials of construction in all branches of industry, including aeroplane manufacture, The Aluminum Castings Company, the world's largest producer of aluminum castings, created in the summer of 1915, a special research and development laboratory, which to-day is known as Lynite Laboratories.

The general organization of these Laboratories is laid out on broad and comprehensive lines, to include:

(1) Research along purely scientific lines in the arts of alloying and fabricating non-ferrous metals;
(2) The adaptation of this scientific knowledge by means of experimental and development methods; and
(3) The scientific control of foundry practice to insure the desired results.

Beginning in a modest way as a department of The Aluminum Castings Company, with a personnel of a single scientist and a works laboratory of a single room in an office building, Lynite Laboratories to-day maintains a staff of over one hundred trained specialists, and occupies 22,000 square feet of floor space, in a building erected for and devoted entirely to research. It is equipped with modern apparatus of wide range and completeness for research and development work. Lynite Laboratories also directs the activities of the commercial testing and control laboratories in the company's various plants.

The scope of the organization plan of Lynite Laboratories, conceived as it was when the research idea was fairly new, has met with much favorable comment on the part of research authorities throughout the United States. Its breadth of plan, based on far-sighted vision, is particularly appreciated in the light of the proposed specifications for the ideal research organization submitted to the Institute of Metals in London only a few weeks ago by no less an authority than Walter Rosenhain, its vice president. This eminent scientist now urges the adoption by the British Non-Ferrous Metal Industry of a research plan* which is as striking as it is identical with the organization of Lynite Laboratories. As a further indication of how completely the British authorities are convinced of the necessity for scientific research as developed in this country and illustrated by Lynite Laboratories, the British Government has just voted to place at the disposal of industrial research the huge sum of £1,000,000 sterling.**



THE METALLOGRAPHY LABORATORY

In the foreground is the potentiometer for precise temperature measurements. It has a sensitivity of .0000001 of a volt. The micro-structure of aluminum alloys is studied through the metallographer's camera in the left-hand corner. The specimen is carefully polished and etched and then placed on the stage of the microscope. The carbon arc lamp on the bench at the right is for illuminating the object

Lynite Laboratories

Lynite Laboratories comprise the following sections:

RESEARCH DIVISION.

1. *Metallurgy Section,* for the investigation of foundry melting practice and the study of the processes of alloying, refining and purification of metals and alloys.

2. *Metallograph Section,* for the determination of the constitution of metals and alloys and the study of the relation of their thermal and mechanical treatment to the constitution and physical properties.

3. *Chemistry Section,* for the analysis of the materials of construction, the maintaining of standards, and particularly alloy development.

4. *Physics Section,* for the investigation of special physical phenomena relating to the company's processes and products.

5. *Tests Section,* for physical tests of alloys, special mechanical tests, heat treatment, production of test bars and special melting tests.

DEVELOPMENT DIVISION

1. *Dynamics Section,* for theoretical investigations and tests to determine design constants for internal combustion engines and their various component parts.

2. *Engineering Section,* for general designing, drafting experimental construction, apparatus construction.

3. *Automotive Engineering Section,* for special automotive design service in engines, pistons, chassis, wheels, etc.

4. *Permanent Mold Section,* for sample production by permanent mold as well as general experimental work for improvement of the process.

5. *Sand Castings Section,* for sample production by sand casting as well as experimental foundry practice in core making, molding and melting.

TECHNICAL CONTROL.

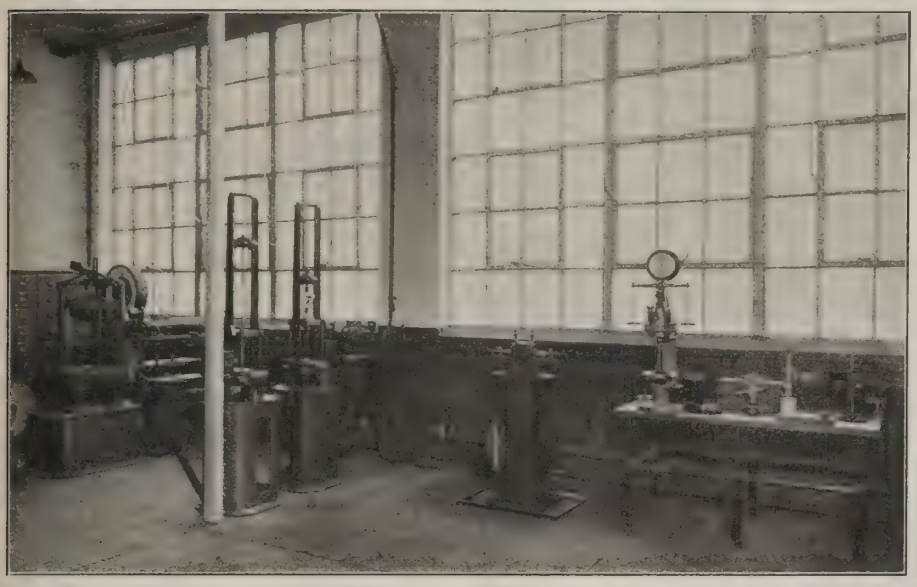
1. *Technical Standards Section,* for technical control of foundry and alloy practice.

An Open-Minded Organization

Before taking up a detailed discussion of the work and equipment of the several sections, a general understanding of the distinct principles upon which Lynite Laboratories was founded should be borne in mind. In the first place, its organization is an open-minded one, in which the specially trained minds in the

* NOTE: Dr. Walter Rosenhain, F. R. S., Vice President of the Institute of Metals, Superintendent of the Metallurgical Department of the National Physical Laboratory, etc., presents his plan for the ideal research organization as applied to the non-ferrous metal industry in *Engineering*, March 28, 1919, Page 422.

** *Chemical and Metallurgical Engineering*, April 15, 1919, page 399.



BATTERY OF MACHINES FOR TESTING PHYSICAL PROPERTIES

The above photograph (reading left to right) shows three tensile testing machines, one of which is operated by hand; an alternating stress machine; a Brinell hardness testing machine, and a sclerescope, also for hardness tests.

Fig. 1—The White Souther Alternating Stress Machine—To determine the ability of a material to resist fatigue loading, a test bar ½" in diameter is rotated at a speed of 1326 r.p.m. A load is applied by means of a spring balance through ball bearings at the end of the specimen, which causes a slight bending. Each time the specimen rotates the stress is reversed. Thus a particle which was in tension at the top of the specimen, after one-half turn, reaches the bottom and is put in compression. The load applied is varied from 20 to 50 lbs., so that the time required to break an aluminum alloy test bar varies from one day to a month or more

various sciences pertaining to the Company's products are co-ordinated under the direction of an administrative mind. This mind is also the point of contact between the Laboratories and the rest of the Company. Every member of the Laboratories organization is impressed with the fact that ideas control markets, and that the company's future depends upon its keeping in advance of the present development of each art or science with which it is concerned. It is held of first importance that the organization be as free as possible from outside influence or the obsessions of any of its members; that each member be free to express his ideas having to do with his particular work, and at appropriate times to express all his ideas with respect to the operation, development and organization of Lynite Laboratories. Ideas of every description,—good, bad, and indifferent,—are thus collected, sorted and classified.

For an idea to receive the attention of the Lynite Laboratories staff it must become a formal problem. Before it can become a formal problem, it must pass the critical scrutiny of a Problem Committee, which includes the heads of various sections of the Laboratories, as well as executives of the company itself.

Supposing the idea has passed this first acid test and has become a formal problem. It is now necessary to determine its status, for nothing must be done that has already been done. Accordingly, all existing information bearing on the problem in any way, whether resting in the files of the Patent Offices, in technical publications, in text books, in the minds of men, or in the library of Lynite Laboratories, is systematically collected, classified and carefully studied. When this has been done, it is quite possible our young and promising problem may be ruthlessly thrown in the discard. If not, it is quickly labelled "urgent," "important," or "common," as necessities of the occasion dictate, and assigned to its particular section or sections, where it is carried along with the utmost speed consistent with its classification until the happy day when it shall be voted "closed."

Research Division

The Division of Research embraces all investigations in the realm of pure and applied science, and is predicated upon the fact that scientific research implies sound reasoning, the ability to marshall facts, and by correct analysis, both elemental and general, arrive at correct conclusions. The division itself comprises the various sections listed above, and works in close co-operation with the Development sections.

Metallurgical Section

The work of this section includes all general metallurgical research not included in the special research field. It consists of a broad study of alloy development and in particular a field investigation of melting practice and improved metallurgical methods.

Chemical Laboratories

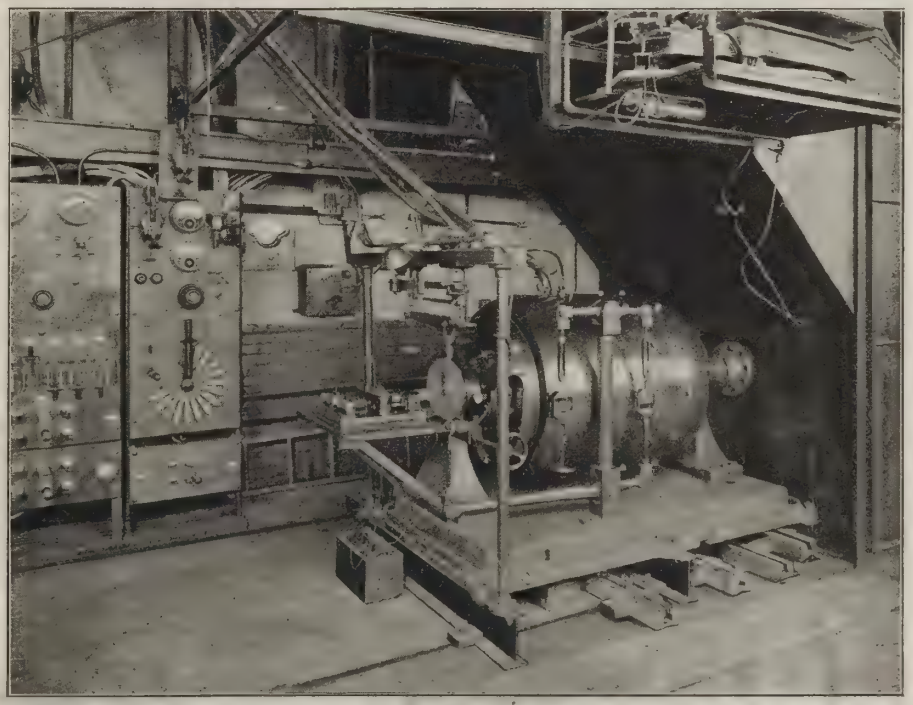
There are two distinct phases of the work of the Chemistry Section, namely: test and research. The exact control necessary to successful operation and research is rendered possible by the chemical testing laboratory. Here is the personnel and equipment necessary for the complete analysis of aluminum alloys, bronzes, and other metals. The everyday question of corrosion and the action of alloys under new conditions, such as heat treating, are answered here, as well as all routine work connected with research.

It has full facilities for small-scale research and includes in its equipment everything in the way of furnaces, hot plates, glass blowers' bench, balance room, fume cabinet, etc.

The research activities are best seen in the special experimental and development laboratory. This laboratory is the stepping stone from the test tube and beaker to plant production. It is an admirable workshop, fully equipped with motors, tools and specially constructed apparatus designed to meet the needs of industrial research work.

Metallography Section

The rapid advance in the arts of producing, fabrication and alloying of metals in the last twenty years has been very



WEIGHING SYSTEM OF DYNAMOMETERS

This system was specially designed and built for Lynite Laboratories. It embodies a multiplying lever, so that the scale reads the pounds torque at a 63-inch arm and makes horse-power calculations very easy. Most of the knife-edges have been dispensed with, and self aligning ball bearings used in their place. The whole system is so delicate that if a quarter-pound weight be placed upon the knife edge on the dynamometer field frame it will show a deflection on the scale



A corner of the Laboratories' own machine shop

largely due to the development of the science of metallography. Briefly defined, metallography is the study of the "constitution" of metals. Just as the doctor investigates a wound in the human body or probes into the vitals themselves, so the metallographist goes beneath the surface of metals, examines their structure and determines their "constitutional characteristics." Many methods are applied in this "humane" work, the most fruitful of which have been thermal and microscopic analyses. Accordingly, the equipment of this section includes a metallographic camera for taking microscopic photographs; a large camera for photographing objects at their actual size; electric furnaces and a special potentiometer for heat treating and cooling curve work, and apparatus for the determination of the coefficient of thermal expansion and the thermal conductivity of alloys.

Physics Laboratory

Appreciating the necessity for physics research to round out the scientific investigations of the Laboratories, a separate section has been created to study the various problems from this point of view. The equipment consists of voltmeters, potentiometers, ammeters, condensers, galvanometers, resistance standards, Wheatstone bridges thermometers of all types, telescopes, and all necessary apparatus for making measurements. The work of this section is essentially research in its character, and therefore calls for special apparatus which is designed and built as needed. In order to maintain close contact with foundry practice, the organization includes an industrial physicist.

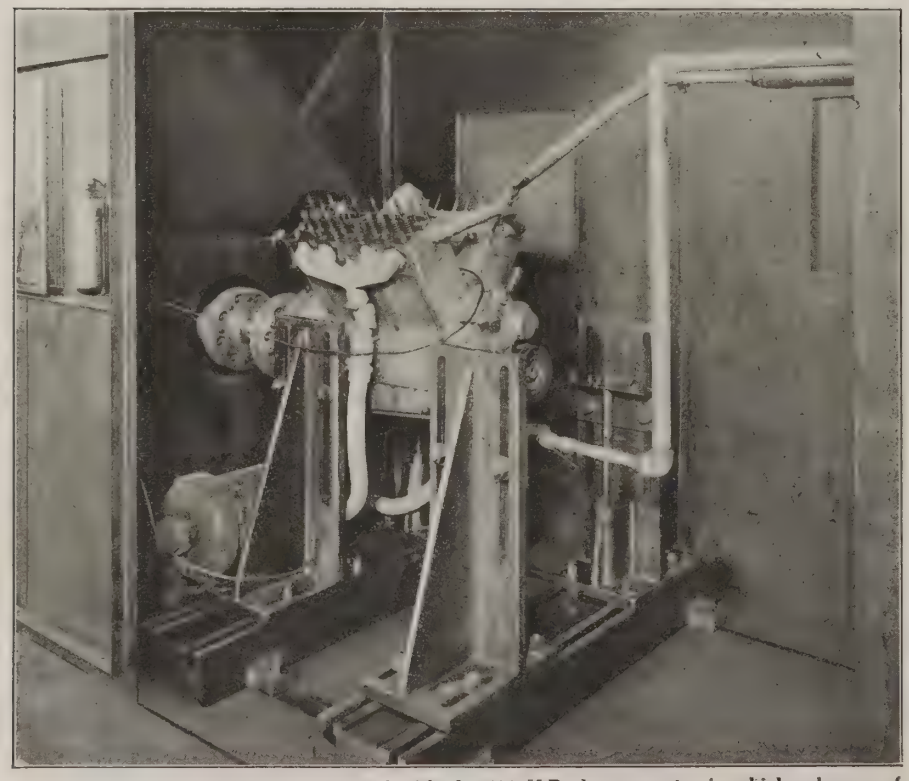
The Tests Section

The Tests Section comprises a test bar foundry and a physical testing laboratory. The work of the foundry consists in the production of test bars, by which the properties of the new alloys may be studied, and also in study of the effect of variation in melting and casting practice. Two oil-fired crucible furnaces are used for melting, while two gas-fired furnaces, one for high temperatures and one for low temperatures, are available for experimental heat treatment.



Fig. 3—CHARPY SINGLE-BLOW IMPACT MACHINE

The use of this machine in the non-ferrous industry is new. A square bar about ⅜" on a side, notched at the center, is supported over a 2" span. The falling pendulum fractures the test bar in one blow. The energy absorbed is measured by the difference between the original energy of the pendulum and the energy remaining after the blow, which is indicated by the height to which the pendulum rises. It delivers a blow of 200 ft. lbs., or the equivalent of a weight of 40 lbs. falling through 5 feet



Here is the large wind tunnel connected with the 400 H.P. dynamometer in which a breeze of 40 miles an hour can be blown past the engine. On the block and ready for test is shown a six-cylinder all-aluminum engine

The work of the physical testing laboratory is both routine and special, according to the nature of the problems with which it is concerned. Under routine tests would be classed the usual tension tests, by which the yield point is determined as well as the maximum stress and elongation. Other properties which may be determined are the reduction of area, elastic and proportional limits and modulus of elasticity—all of which have a very important bearing on the use to which the alloy may be put. There are no less than four tensile testing machines, with a capacity from 10,000 to 200,000 pounds, thus insuring tests on a wide range of work. Take for ex-

ample the 50,000-pound machine. This machine will take a standard test bar of a material having a maximum stress of as high as 250,000 pounds per square inch. The 200,000-pound testing machine is used in making tests on large aluminum castings.

There are two standard ways of measuring hardness. One is by microscopic examination of the depth to which a hardened steel ball is forced by pressure upon the alloy under test. This is the Brinell test. Here a ten mm. steel ball is forced into the metal by hydraulic pressure. For soft metals, a pressure of 500 kg. is used, while for hard metals 3,000 kg. is necessary. The diameter of the indentation is measured by means of a microscope from which is calculated the Brinell hardness number. This value is read directly from tables, and represents the load in kg. per square mm. of spherical area of the indentation. The other method of determining hardness is by means of the rebound of a small hammer. The instrument used is known as the scleroscope. It consists of a hammer which falls from a fixed distance inside a glass tube. The height of the rebound of this hammer gives the scleroscope hardness.

Another physical test, not as common as those mentioned but of considerable importance in certain cases, is the transverse test. A standard bar is supported at two points, say 12 inches apart, and a load applied in the center. The testing machine weighs the load applied, and measures the deflection of the test bar.

Compression, or the ability of a material to resist "push," is also measured in the tension testing machines.

The special tests include fatigue and impact tests, as well as tests on fabricated parts. In the impact field the Stanton Repeated Blow Impact Machine is of particular interest. It is an English machine, and very popular with British engineers. The test tells how the material will stand up under repeated blows in actual operation. Fig. 2.

The Charpy Single Blow Impact Machine is of French inheritance. A falling pendulum fractures the test bar in one blow. Fig. 3. This machine has wide use in steel testing, but its application to non-ferrous metals is radically new and of considerable significance.

The White-Souther Alternating Stress Machine shows how a material may resist "fatigue," for metals seem to tire just as human beings do. Fig. 1.

The Dynamics Laboratory

The Dynamics Laboratory occupies a room about 110 feet long and 25 feet wide. Its work consists of theoretical investigations of internal combustion engines, and in particular, study of such parts as use aluminum alloys. It conducts all tests for establishing principles used in design, and includes routine tests to determine piston and cylinder wear and the general testing of gear wheels and rear axles. The principal equipment consists of three Sprague dynamometers:

One rated at 400 H.P. at 1400 r.p.m.
One rated at 200 H.P. at 1350 r.p.m.
One rated at 100 H.P. at 1200 r.p.m.

In installing this equipment, the customary bed plate was not used, but instead a special channel construction was embodied in the concrete floor to which the dynamometers could be bolted. This gives the equivalent of a bed plate extending the entire length of the room. The advantages of this are apparent. The dynamometers can easily be moved around to any position on this space, and two or more can be connected in tandem, which makes it possible to test an engine whose power output is greatly in excess of the capacity of any one individual dynamometer.



VIEW OF DYNAMIC LABORATORY

showing three Sprague Electric Dynamometers, Alden Absorption Dynamometer for rear axle tests, and generators. Note the channel construction in the floor, giving a bed plate extending the length of the laboratory, and also the amount of floor space available due to the overhead location of apparatus and devices

Another advantage of embodying the bedplate in the floor is that the length of the engine or other piece of apparatus which is being tested is not limited by the length of the bedplate. This is especially advantageous in a laboratory in which a great variety of work must be done, and where the testing is not limited to engines of one size.

The weighing system of the dynamometers was especially built for the Lynite Laboratories. It embodies a multiplying lever, so that the scale reads the pounds torque at a 63-inch arm. This makes horse-power calculations very easy. In this weighing system, most of the knife edges have been dispensed with, and self-aligning ball bearings used in their stead. The whole system is so delicate that if a quarter-pound weight be placed upon the knife edge on the dynamometer field frame, it will show a deflection on the scale.

The revolution counting device was also especially built for this Laboratory. It consists of two Veeder counters con-

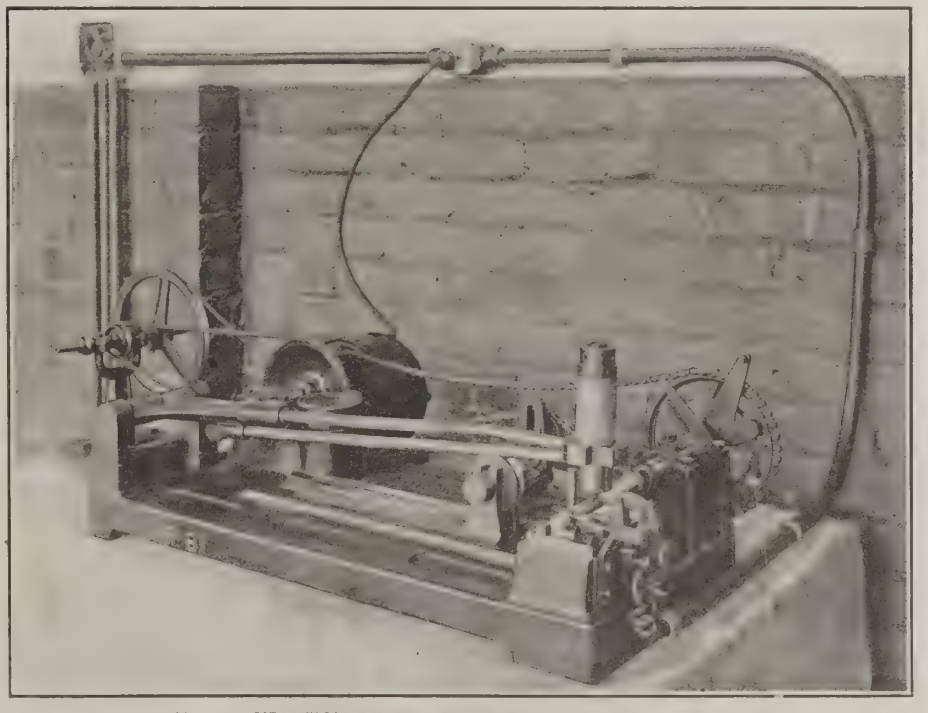


Fig. 2—STANTON REPEATED BLOW IMPACT MACHINE

This machine tests the ability of material to withstand repeated shock. The specimen ½-inch in diameter is supported by knife edges 4½ inches apart. A hammer weighing approximately 3 pounds is dropped upon the center of the bar, which rotates so that the second blow hits 180 degrees from the first. These blows are repeated at the rate of 100 per minute. The height of the fall of the hammer may be varied up to 4 inches, so that the test bar may be broken in one blow, or require a week or two weeks of continuous operation before fracture takes place

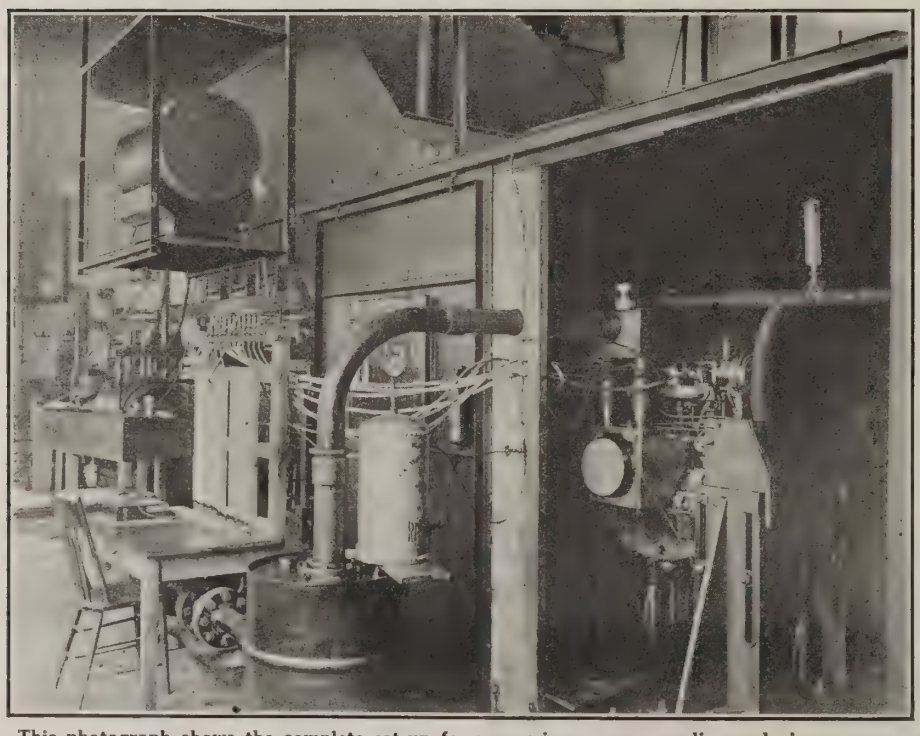


Testing laboratory of the Chemistry Section, showing balance room, fume cabinet, etc.

nected through a gear box to the dynamometer shaft. These counters are provided with a jaw clutch which can be thrown in and out electrically. The wiring is so arranged that when one counter is thrown in, the other one is thrown out. Readings can therefore be taken at regular intervals without losing the total count.

The flexible couplings were all built in the Laboratories' own shops, and consist of two flanges, one connected to the engine, and one to the dynamometer, and an intermediate piece connected through leather discs to each of the other two flanges. So that the leather may not be called upon to carry the weight of the intermediate piece, this piece is supported on spherical protections centered in the discs connected to the engine and the dynamometer. The leather, therefore, transmits only the torque. Several of these couplings are made of Lynite castings.

In connection with the 400 H.P. dynamometer, there is installed a wind tunnel, so that the engine under test may be placed in a breeze varying from 35 to 40 miles an hour. In this case it is not necessary to connect the exhausts of the separate cylinders to a manifold. The breeze can blow out the exhaust quite easily. The operation of the engine can be observed through windows. When making long endurance tests of engines, it is also desirable to use this wind tunnel for keeping the engine at a reasonable temperature.



This photograph shows the complete set-up for measuring power, gasoline and air consumption, as well as for determining temperature in each exhaust pipe and pressure in the inlet and exhaust pipe for each cylinder

The fuel is contained in a tank mounted on a delicate scale and fed to the engine by gravity. Weighings are made over as long a period as possible, rarely less than two minutes, depending somewhat, of course, upon the size of the engine and the speed at which it is running. At least three readings are taken.

The air consumption of engines can be measured by the use of Venturi meters. The laboratory possesses various sizes of such meters, and the necessary expansion and deadening chambers to go with them. Having measured the air and the fuel, the mixture ratio of course can be calculated, and their measurement is of no little importance in studying the performance of an internal combustion engine. The air measurement of course is also used for determining the volumetric efficency.

On its way to the engine, the cooling water passes through a Venturi meter, which measures the rate in pounds per minute. The temperature of the ingoing water is kept constant by the use of a thermostat. Both in-going and out-going cooling water temperatures are measured with mercurial thermometers.

The heat loss in exhausts can be measured in a calorimeter. In making this measurement, the exhaust gas is passed through water, and the increase in temperature of the water as well as the quantity is noted. This apparatus must generally be built to accommodate the size of the engine. All the parts, however, entering into its construction are included in the apparatus of the laboratory.

The work of the dynamics laboratory is not limited to making tests of internal combustion engines. Gears, rear axles, etc., are also included in the work done in this department. For this reason the laboratory is also equipped with the Alden absorption dynamometer. This is for use in absorbing power at extremely low speeds, such as is necessitated in making tests of rear axles.

Since it is impossible to purchase direct current, it is necessary to make it. For this purpose two motor generator sets are employed. One, at 10-K.W. 120-volt D.C., is used for exciting the dynamometer fields and supplying small quantities of direct current to the other laboratories, such as the chemical and metallographical. The other one is a 150-K.W. set, and converts 400 volts 3-phase alternating current to 250 volts direct current, for running the dynamometers. Although it means extra and expensive equipment, there is a considerable advantage in generating the direct current rather than purchasing it. This advantage consists in the fact that the voltage is controlled. Very frequently it is desirable to supply a dynamometer with lower voltage current so as to get slower speed when operating the dynamometer as a motor. When current is purchased from the outside, speed must be reduced by inserting armature resistance. This is more or less difficult, but if the current is generated within the plant, you can merely reduce the voltage on your generator.

The arrangement of the electrical switchboards has been worked out to make them accessible and keep them as safe as possible. The incoming leads carry 440-volt 3-phase alternating current. The direct current is distributed through the laboratories from the panel placed between the control panels for the 200 and 400 H.P. dynamometer, as is shown in the illustration. For convenience, receptacles carrying both alternating current and direct current have been

conveniently located around the walls of the laboratory. Also high and low pressure air outlets, as well as gas, are conveniently located.

The laboratory is well equipped with apparatus for standardizing thermometers and gauges. This is kept in operating condition so as to minimize the amount of work necessary to calibrate a gauge or a thermometer, and thus encourage making such calibrations at frequent intervals.

Much attention has been given to the method of recording observed data. Four data sheets are used, and are designated as "a," "b," "c," and "d." Sheet "a" contains spaces for the observations in making all power measurements of an engine. Sheet "b" is especially arranged for recording data relative to fuel consumption, cooling water, and lubrication. Sheet "c" is suitable for recording information relative to the air consumption and exhaust measurements. Sheet "d" is a blank sheet, divided into columns, and is intended for use for special tests. Besides providing space on Sheet "a" for recording power observations, space has also been provided for putting down calculated results and for transferring results from Sheet "b."

This section has developed a very complete set of data sheets upon which are recorded the results of all tests, including graphic charts and drawings.

Development and Experimental Division

Under this heading comes the second group of workers employed in scientific research. Theirs is the duty to utilize the knowledge of science and by experimentation to put new products or processes into production. They may be called "the adapters." The relation between this division and that of the Research Division, as well as technical control, which is briefly referred to below, is very close and often overlaps, so that it is sometimes difficult to place a certain type of work entirely in any one division.

General Enginering and Automotive Enginering

These are two separate and distinct sections, though of course closely correlated. Experimental and development work requires an outfit of machinery and tools having the minute accuracy of the specialized tool room, and at the same time the range and adaptability of the contract shop. Accordingly, the General Engineering Section is provided with a full line of tools and machinery to meet these extraordinary demands. Its work calls for the building of special aparatus and machinery for experimental purposes, the machining of specimen bars for various tests, and the repairing of all apparatus of the laboratories that calls for machine work, from the microscope to the dynamometer. It has its own drafting and designing corps and keeps its own special drafting records and files.

Due to the expansion of the automotive industry, it has been considered necessary to have a special staff of experts to devote their entire time and effort to design and engineering in this field. This section is concerned with all theoretical principles of design involved in the evolution of the automobile. It further includes experts in the various special branches of automotive design, particularly motor car and aerial engines. It is further specialized to include experts on the various parts of those engines, such as the piston, the cylinder, the connecting rod, and other parts that may be made of aluminum alloys or involve the use of them.

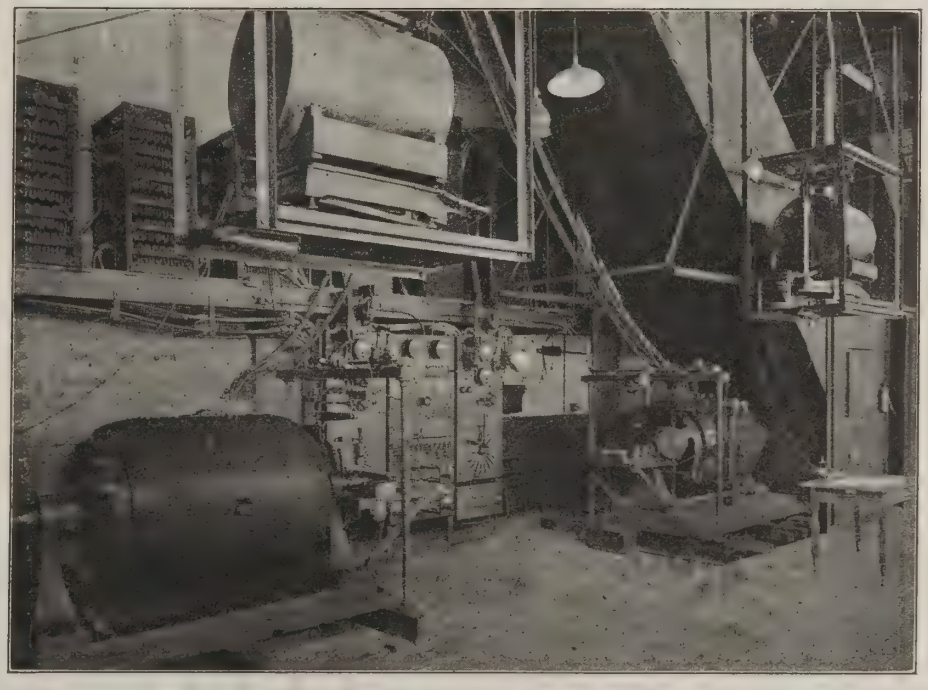
The Process Sections

The Permanent Mold, and Sand Casting Sections may be classed under the above heading for the sake of brevity. Each of these sections is concerned with experimentation and development work in a specially assigned field. Not only new processes, but new products are the fruits of these sections. Here is where the ideas converted into formal problems by the Problem Committee, after thorough scientific study and test in the other sections outlined, are actually put into tangible form. From here the new processes or products go into production.

These Sections exist as complete departments, with their own special foundry equipment and machinery complete. As in every other section of Lynite Laboratories, each section is directed by one man and has its own special organization, all supervised by a director of development, corresponding to the director of research, both of whom are responsible to the manager.

Technical Control

This is the third large division into which The Aluminum Castings Company divides its research organization. Its activities are controlled by the director of research. Its work is to regulate and improve foundry practice in all the company's plants. It supervises ordinary routine technical control conducted through laboratories connected with the individual plants, but devotes the greater part of its effort toward the extension and improvement of technical control policies, the introduction of new processes, and the maintenance of foundry standards.



This is a close-up of the 200 H.P. and 400 H.P. Dynamometers, showing their respective control panels on the switchboard. Direct current is distributed throughout the rest of the Laboratories from the panel in the center

OFFICIAL STORY OF C-5 DIRIGIBLE'S RECORD FLIGHT TO NEWFOUNDLAND

THE Navy Department has made public the official report of Lieutenant-Commander E. W. Coil on the recent flight of the naval dirigible C-5 from Montauk Point, Long Island, to St. John's, Newfoundland, a distance of 1,022 nautical miles. The report emphasizes the fact that it was not due to any lack of precautions that the C-5 was lost from her moorings.

After describing in detail the preliminary work the report says:

"Start was made from the naval air station, Montauk, L. I., N. Y., at 8 a.m., May 14, 1919. Departure was taken from Montauk Point and course laid for the naval air station at Chatham, Mass., which point was passed over at 10:10 a.m. Air conditions at the time of start were generally excellent. A southwest wind of 18 miles an hour was blowing. A light haze prevailed. No particular incidents of interest occurred in this part of the trip. Everything about the C-5 was functioning properly, engines running at 1,100 revolutions a minute.

"After passing over the naval air station at Chatham course was set for Cape Sable, taking departure from Chatham. The course was checked by a series of bearings of points on shore and compass error found by azimuths of the sun. Due to haze visibility was not very good. Landfall was made on the southwest coast of Nova Scotia, about 20 miles north of Cape Sable, at 2:30 p.m.

Rough Weather Encountered at Nova Scotia

"The passage from Chatham to Nova Scotia was smooth and without incidents out of the ordinary. After sighting the coast of Nova Scotia course was set to cross overland to the eastern coast of Liverpool. During this passage extremely rough air conditions were encountered, the C-5 yawing, diving and climbing at all angles.

"Every part of the structure was subjected to strains of the severest possible nature in the air, but no failures of any kind occurred. In one sharp dive of about 400 feet the tail fin nearly struck the ground, the C-5 answering her controls just in time to avoid a smashup.

"The east coast of Nova Scotia was reached at Liverpool at 3:45 p.m., where the C-5 passed to sea for a distance of about 10 miles and course was held along the coast of Nova Scotia. Air conditions even over sea were rough and steadily becoming worse. The wind was increasing and shifting toward west. Past abeam of Halifax at 5:10 p.m.

"The sky was overcast and darkness prevailed. Air conditions were growing worse and some difficulty was experienced in holding the C-5 to her course. A rain squall was encountered at 10 p.m. and lasted until 10:45 p.m.

"At 11:15 p.m. passed over Scutari Island,

(*Continued on page 702*)

THE FARMAN TOURIST AEROBUS



THE first civilian passenger service flight between the French and Belgium capitals was inaugurated March 27th, when one of the Farman Type F-60 Tourist Aeroplanes left Tousses-Le-Noble near Paris. On May 6th, the Goliath ascended to an altitude of 5,100 meters (16,732 feet; more than three miles), carrying twenty-five passengers. This altitude was reached in one hour and 15 minutes; the descent was made in 25 minutes.

This huge tourist aero bus was built to acommodate twenty passengers. Its size has suggested the name "Goliath," the name by which the F-60 machine is now popularly known. On the first flight the distance each way was covered in less than three hours. It is expected that service between the two cities will be weekly until further notice.

The forward part of the fuselage is provided with comfortable light wicker chairs and many accommodations for the aero tourists. The pilot's compartment is open at the top permitting the necessary unobstructed vision, but the remainder of the fuselage is entirely enclosed, with windows on the sides.

Dimensions

	(*Meters*)	(*Feet*)
Span, upper plane	28	91.86
Span, lower plane	28	91.86
Length overall	14.750	48.39
Height overall	5	16.4
Chord, both planes	3.06	10.25
Gap between planes	3	9.84

Weights

	(*Kgs.*)	(*Lbs.*)
Weight, empty	2,000	4,409.24
Useful load	2,000	4,409.24
Fuel	520	1,126.24
Total load	2,530	5,555.64
Weight fully loaded	4,520	9,964.88

Performance

	(*Km.*)	(*Miles*)
Maximum speed, per hour	160	99.44
Minimum speed, per hour	60	37.00

(*Time of Climb*)	(*Altitude*)
4 minutes	1,600 feet
10 minutes, 30 seconds	3,200 feet
17 minutes	5,000 feet
25 minutes	6,500 feet

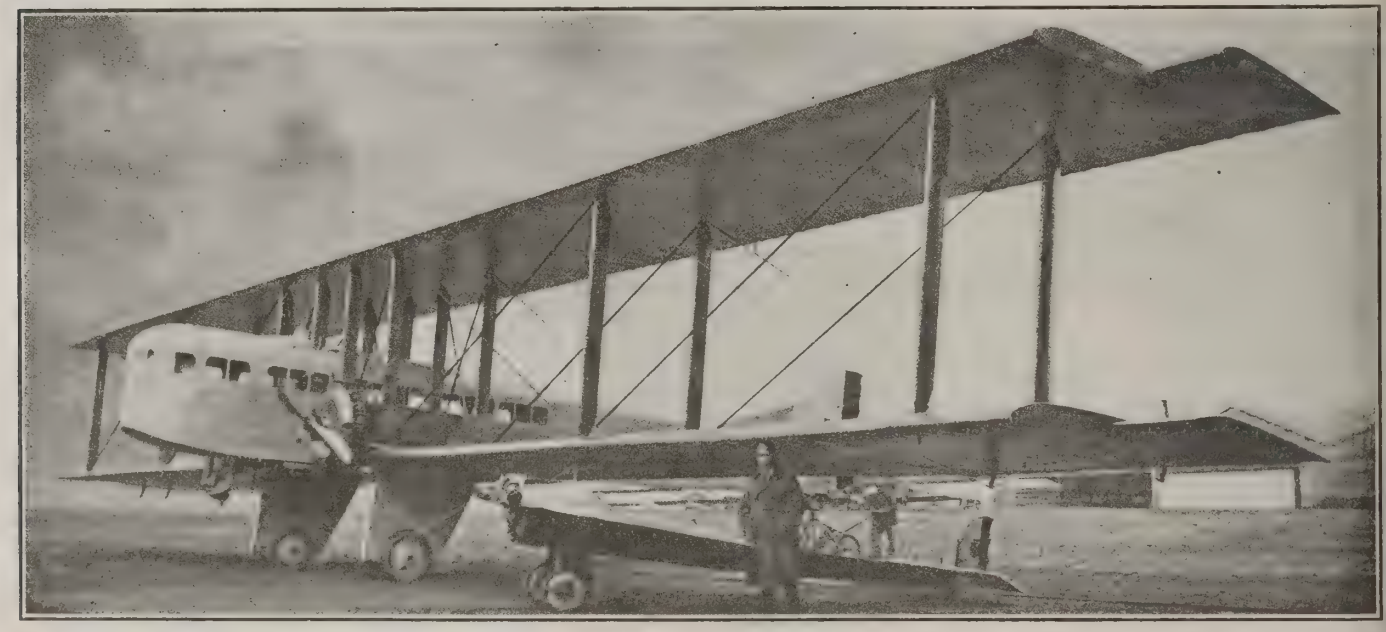
The upper and lower planes are similar in outline and area. Area of both planes is 164.89 sq. m. (1,775 sq. ft.). Center struts running up from the fuselage are spaced 1.328 m. (4.3 ft.) apart. From these struts, interplane struts behind the engines are spaced 1.336 m. (4.37 ft.). This spaces the engines 4 m. 13.12 ft.) apart. The landing gear struts are located below the engines.

From the engines, intermediate and outer interplane struts are located 5 m. (16.4 ft.). The overhang, not including ailerons, is 1.25 m. (4.09 ft.). Ailerons are 3,760 m. (11.44 ft.) long; width, 1.065 m. (3.35 ft.). The ailerons are of the balance type and at the balanced portion they are 1.875 m. (3.38 ft.) in width.

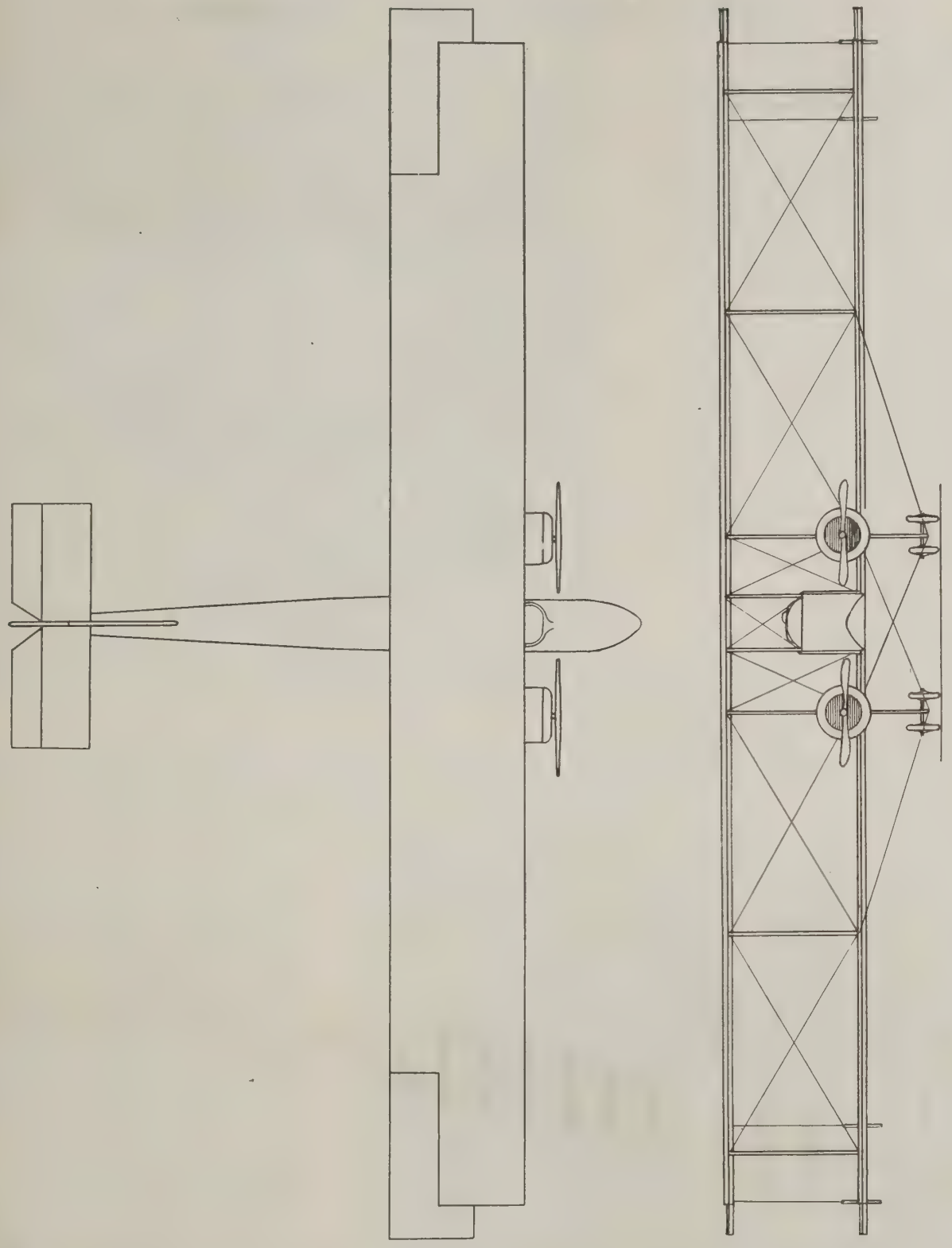
The tail unit is 5.500 m. (18.04 ft.) in overall span. Stabilizer, 1.100 m. (3.6 ft.) wide. Elevators are .800 m. (2.62 ft.) wide.

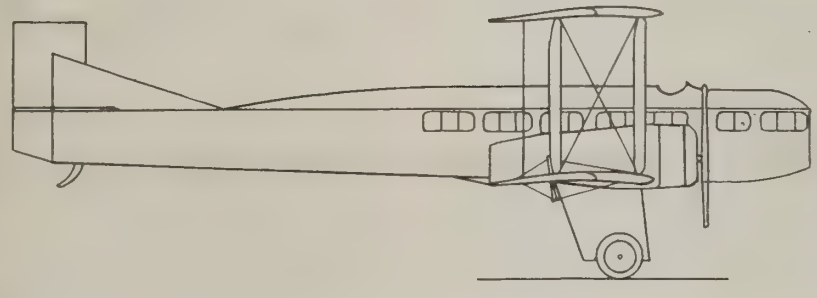
The rudder is 2.500 m. (8.2 ft.) in height. It is of the balance type. Average width .750 m. (2.46 ft.) Width at the balanced portion 1.250 m. (4.09 ft.). The fin extends 4.040 m. (13.24 ft.) forward of the trailing edge of the rudder.

The engines used are Salmson 9 cylinder "Star," each giving 260 H.P. Fuel consumed at the rate of 104 pounds per hour.



The two extremes: The twin-engined 520 H. P. Farman "Goliath" Type F-60 Tourist Aerobus with a wing spread of 92 feet, contrasted with a Farman Monoplane, called the "Mosquito," which has a wing spread of 17.7 feet and a 40 H. P. engine. The "Goliath" makes a speed of 99 M. P. H. and the Monoplane a speed of 62.15 M. P. H.





FARMAN TYPE F-60
20 PASSENGER 520 H.P.
TOURIST AEROBUS

Meters
1 2 3 4 5

McLaughlin

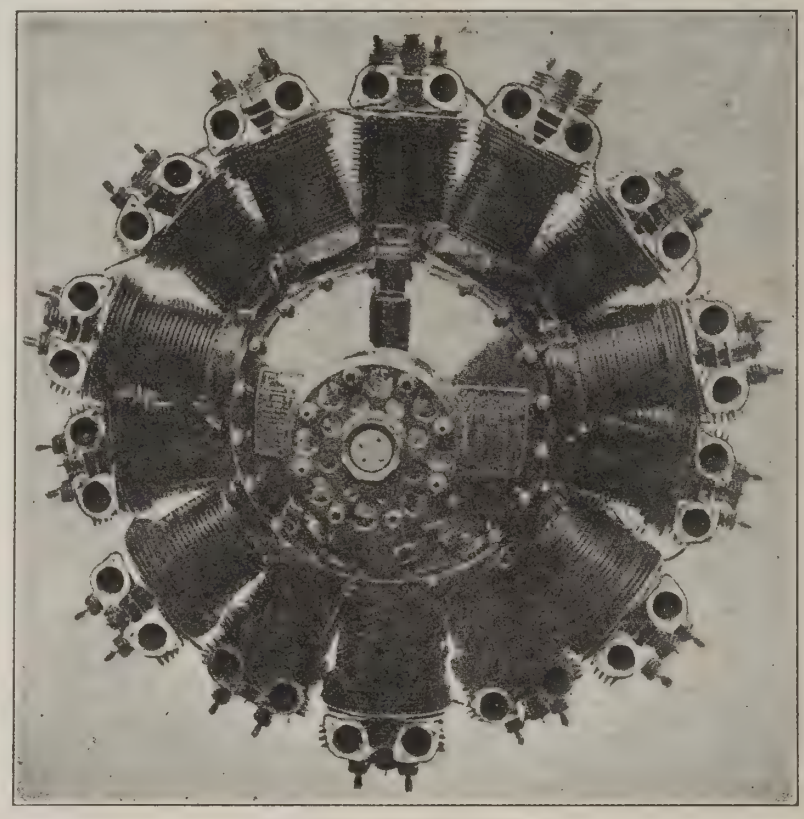
THE COSMOS AERO ENGINES

THE last half of 1918 saw the end of several things besides the war. One of them was prejudice against and objections to radial engines. In fact, November 11 saved the poor Hun from more than one unpleasant aerial novelty, and in particular from the forthcoming results of the development of some new engines of this type.

Rotaries have for some time been humming their swan song, but the stationary radial has taken on a new lease of life. Dilation on the good points of this type of engine is unnecessary, but it is only recently that engines have come into existence wherein the good points of the type have not been obscured by bad design or workmanship.

One of the firms who have specialized in the radial engine and have pinned their faith to the type is the Cosmos Engineering Co., Ltd., of Bristol, formerly known as Brazil, Straker & Co., Ltd., and still more formerly as Straker-Squire. To those who know their car histories little more need be said. The Cosmos Co. is not entirely identical with the car people, but it is not far removed as offspring go.

Research and experiment have led to the production of two radial engines by the firm—the "Mercury" of 315 h.p. and the "Jupiter" of 500 h.p., of fourteen and nine cylinders respectively. Other engines will be, and, indeed, are being, designed and produced, but upon the success of these two engines the makers have decided to commit themselves definitely to a program of peace-time production. Aero-engines are to be the product with which the Cosmos Engineering Co. will make their bid for prosperity, and radial engines are the particular type with which the firm will be concerned. Money and time and the inclination to make use of both are all at hand, and further experiment and research are to be continued.



Front view "Mercury" engine

The "Mercury" Engine

The "Mercury" engine—two rows of seven cylinders each—was introduced to satisfy Air Board Scheme A issued in April, 1917. Its main details are:—Maximum diameter, 41⅝ ins.; bore, 4⅜ ins.; stroke, 5 13/16 ins.; power output, 315 b.h.p. at 1,800 r.p.m. (normal) and 347 at 2,000 r.p.m. (maximum); total weight, without fuel and oil tanks, but with the engine absolutely complete even to the gun synchronizing gear, 582 lbs.

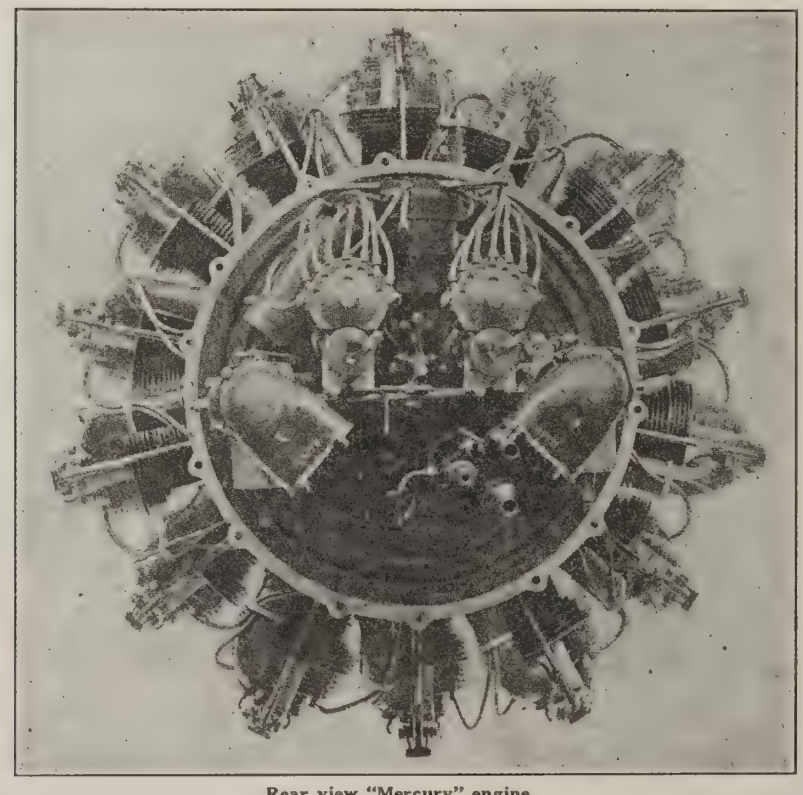
Front and rear view illustrations are reproduced herewith, which make quite clear the general lay-out of the unit, including the ignition apparatus of two 7-cylinder M.L. magnetos and Remy 14-cylinder distributor and the two carburetors bolted to circular induction chambers on the crankcase. The mixture is conducted from these chambers by separate induction pipes to each cylinder and admitted through one inlet valve. The three overhead valves per cylinder may be seen in the front view of the engine; the tappet gear is of the roller type, arranged in a circular unit, which can be assembled complete before attachment to the crankcase.

As regards constructional details not apparent in the illustration, the cylinders are turned from a solid billet, the fins integral with the barrel. Separate aluminium heads are bolted onto the cylinder barrels. These heads are so designed as to obtain effective cooling of the valve seatings and ports and to avoid all distortion. The crankshaft is of the two-throw type on roller bearings throughout. The rollers of the big-end bearings run direct on the crank-pin, and each connecting-rod has its own crankshaft bearing, so that the seven rods of each row of cylinders lie side by side on their respective crank-pins. An interesting feature of this part of the engine is that the whole crankshaft assembly can be withdrawn complete, with the connecting rods in position. The tappet gear is of the roller type, the tappets operated by two cam rings, each having three cams and working at one-sixth engine speed.

Lubricating is on the dry sump principle, and the oil is drawn by one pump from the tank mounted in the fuselage, delivered under pressure to the hollow crankshaft, and, after being led by separate leads to all necessary parts, is returned to the tank by another pump.

On this engine the airscrew is ungeared, the airscrew boss being driven direct through serration on the crankshaft. The airscrew boss is to Air Board standard design.

On the Bristol Scout Type "F" this engine has been given exhaustive flying tests, and has given extremely satisfying results.



Rear view "Mercury" engine

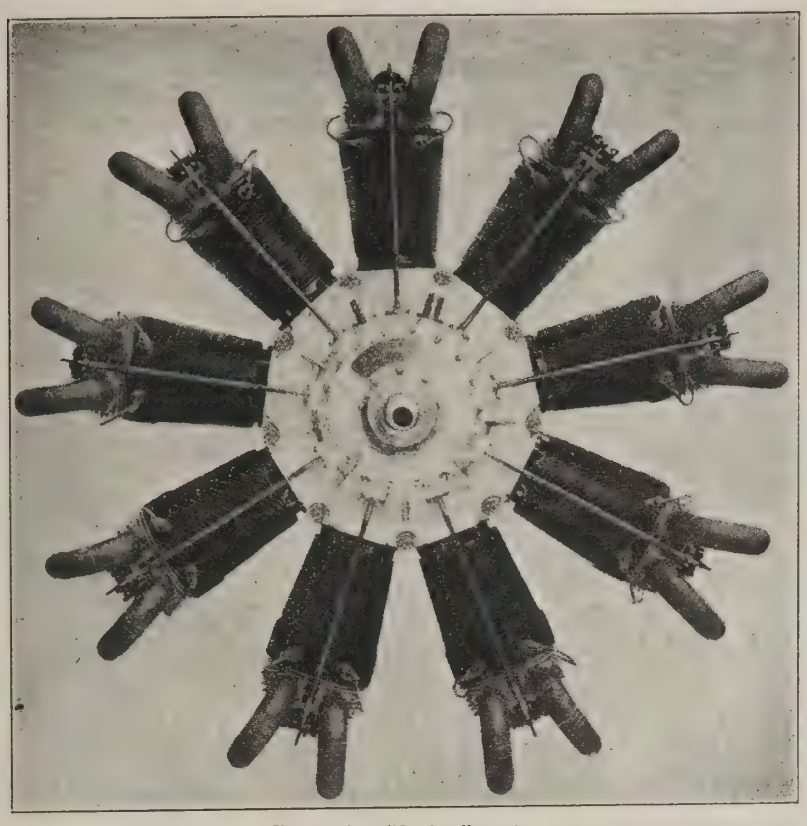
The "Jupiter" Engine

From one point of view the "Jupiter" engine may be classed with the Rolls "Condor" and the Siddeley "Tiger." The Armistice came at a time when it had done no more than prove its potentialities by means of bench tests, and, in the sphere for which it was designed—Hun strafing—the engine will never have its chance. With this in mind, one might be forgiven for regretting that the Armistice was not postponed till Christmas Day.

The rear view of the "Jupiter" engine makes clear many of its constructional features. There are nine cylinders made on lines similar to those of the "Mercury," but the bore and stroke are 5¾ ins. and 7½ ins. respectively, while the power output is 450 h.p. at 1,800 r.p.m. as an ungeared engine or 500 at 2,000 r.p.m. with a geared down airscrew. The weight of the ungeared model is 662 lbs. complete, including electric starter, but without fuel and oil tanks.

An Important Feature

From the illustration the engine might be taken to be of the rotary type, owing to the arrange-



Front view "Jupiter" engine

ment of the inlet pipes, which form part of a very interesting induction system. As will be seen, three carburetors are bolted to the crankcase cover, which also forms one side of the induction chamber.

This induction chamber is annular, and into it is fitted a spiral fluted aluminium casting which acts as a gas distributor to the cylinders. Each of the three carburetors supplies three cylinders *via* the spiral, which delivers the carbureted charge to the correct cylinder in turn, with the advantage that each cylinder is more efficently supplied with mixture, and, if one cuts out, none of the others is affected. On bench tests the arrangement has proved itself a success.

Two inlet and two exhaust valves are fitted per cylinder, operated by two cam rings, each with four cams running at one-eighth engine speed, through tappets mounted in the front of the engine. Ignition is by two 9-cylinder ??????°??-Bennet magnetos driven by bevel gearing from the crankshaft and mounted on the back cover of the crankcase—i.e., the cover of the induction chamber—in such a position that the contact breakers are readily accessible.

With the exception of the connecting-rod assembly, the engine is, in essentials, similar to the "Mercury." A master connecting-rod with articulated rods is used. The bearing of the master rod is white metal lined, all other bearings in the engine are of the roller type. It is hardly necessary to point out that the crankshaft in the "Jupiter" engine is of the single throw type.

It is difficult to say much by way of general review of engines that have not long been in the public eye and that have not had the opportunity of proving their mettle in continuous service. The induction system of the "Jupiter" engine and the cylinder head construction of both engines are, however, proof that the engines have brains behind them, and that precedent and tradition are not being followed blindly.

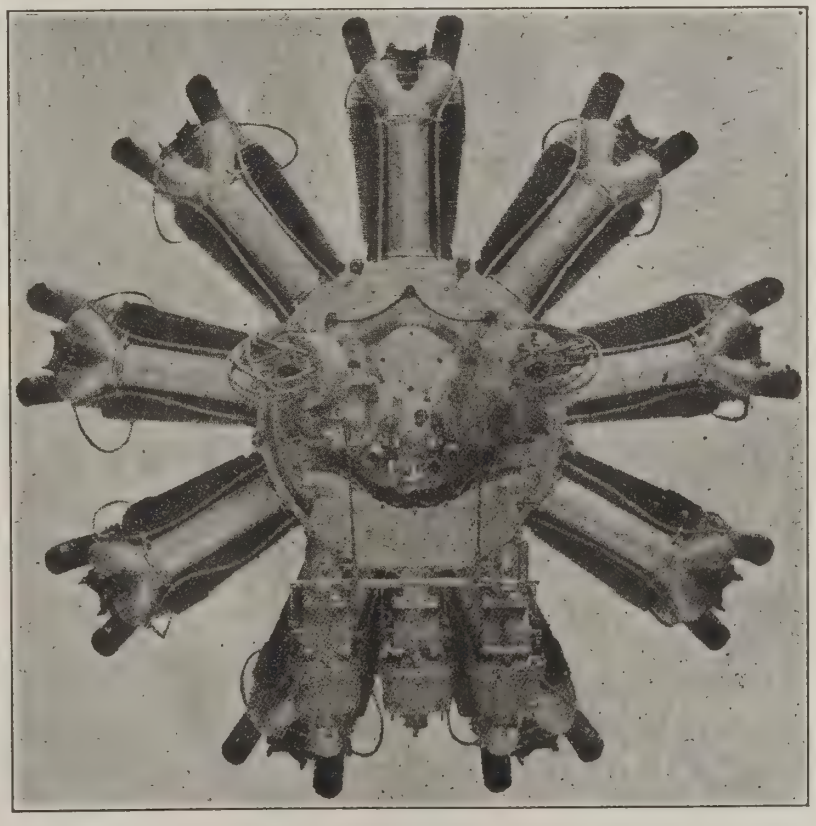
Locating Engine Troubles with the Geophone

The geophone, a listening instrument invented by the French during the war to detect enemy sapping and underground mining operations and for the location of enemy artillery, is capable of a number of interesting peace-time applications, according to the Bureau of Mines. These include the locating of miners who have been entombed after an accident, for bringing approaching tunnel headings together accurately, preventing accidents from explosion when breaking through and for locating underground fires and knocks in the valves and cylinders of automobile engines. When used for this last purpose the instrument, which is small and essentially a seismograph, should be mounted on a short iron rod that can be easily inserted in and around the machinery that is being tested.

The instrument consists of an iron ring of about 3½-in. diameter with a lead disk suspended in its center. A single bolt passing through two mica disks, one of which covers the top and the other the bottom of the ring, serves to keep the lead disk in the proper position. Two brass cap pieces, the upper one having an opening in its center to which is fastened a rubber tube, leading to a stethoscopic ear piece, complete the instrument. Bolts fasten the cap pieces to the iron ring and also serve to hold the mica disks in place.

If the instrument which in reality is nothing but a lead weight suspended between two mica disks cutting across a small air-tight box, is placed on the ground, the energy due to any pounding or digging that may be going on in the vicinity is transmitted as a wave motion to the earth, and these earth waves shake the case. The lead weight because of its mass and also because it is suspended between the mica disks remains comparatively motionless. Thus the relative motion is produced between the instrument case and the lead weight, the result being that the air in the instrument is compressed and rarefied and this in turn is carried to the ear drum through the rubber tube connecting the instrument with the ear piece.

Two instruments, one for each ear, are ordinarily employed, and by moving them a point can be found where the sound will be of the same apparent intensity in both ears, thus enabling the direction from which the sound is coming to be determined accurately.



Rear view "Jupiter" engine

NOTES ON CEMENTED SEAMS AND RUBBER CEMENTS WITH REFERENCE TO BALLOON CONSTRUCTION

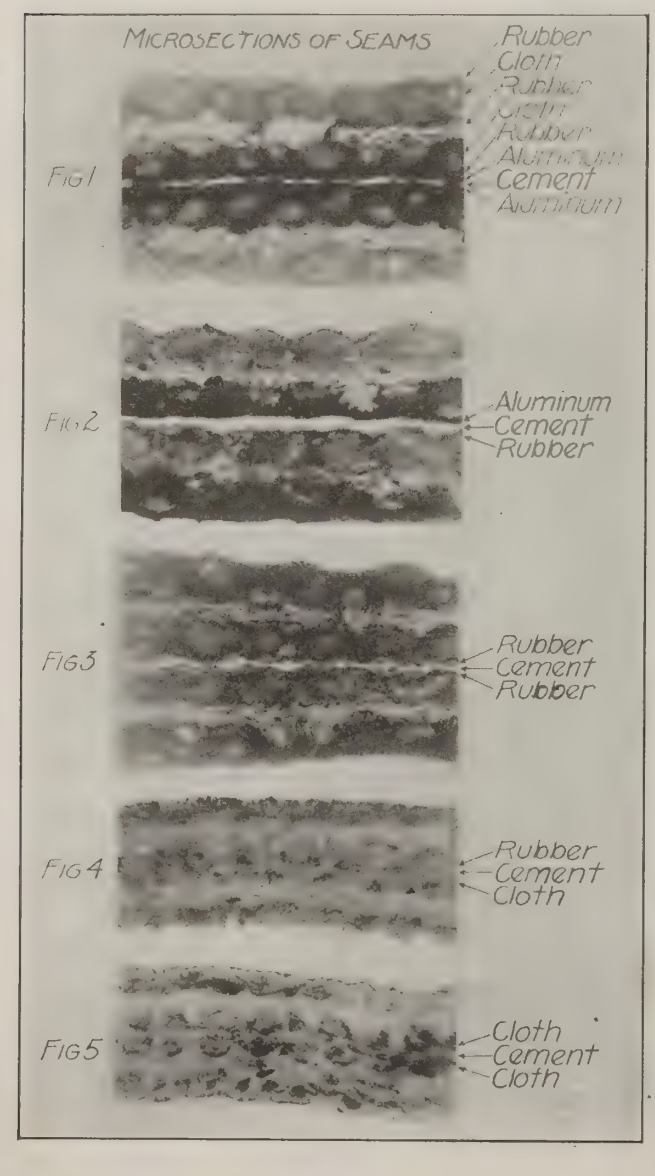
By J. D. Edwards, Associate Chemist and I. L. Moore, Assistant Chemist, Bureau of Standards

I. Introduction

RUBBER cement finds many uses in the industry, particularly for the fabrication and repair of rubber goods. Nowhere perhaps, is a knowledge of the principles underlying its use so essential as in the fabrication of a balloon, which requires the cementing together of the different pieces of fabric to build up the gores and panels which form the envelope, and for the attachment of appendages, and the cementing of patches. In addition to being gas-tight these seams must also bear considerable mechanical load, and although they may be further strengthened by stitching, it is of some importance that the cemented joint shall be as strong as possible because any slipping will throw an undue load on the stitching. Furthermore, any loosening or slipping of the seam will cause excessive leakage of the balloon gas.

The Bureau's attention was called to this matter by some experiments of the Goodrich and Goodyear rubber companies on cementing aluminum coated fabrics together. The unexpected result of these tests was that when the aluminum coating was buffed off, presumably to give a better holding surface for the cement, the cemented joint made thereon was inferior in strength to joints made without any preliminary treatment of the surface.

In endeavoring to arrive at the proper explanation for this fact we have made numerous tests on seams and cements. The object has been to establish the principles underlying good seam construction and to develop suitable methods for testing the seams and cements under investigation.



II. Characteristics of Seams

In constructing a balloon envelope there are a variety of surfaces that may have to be cemented together and, as we have already noted, the character of the surfaces has an important effect on the strength of the cemented seams. For determining the strength of seams which were to be investigated, the following test was adopted as a standard:

The seam was prepared by first washing with benzene or gasoline the surface to be cemented, and then applying smoothly two coats of cement. The first coat of cement was allowed to dry somewhat before applying the second coat. Before the second coat was fully dry, the surfaces were lapped and pressed firmly together by rolling with a steel roller; and the width of lap used was 0.5 inch. These seams were allowed to set for at least 24 hours before testing. Strips one inch wide were then cut from the larger pieces and suspended in a constant temperature air bath under a tension of 1 kilogram. The time required for the seam to break was taken as a measure of its strength.

(1). *Effect of Character of Surface.*—Seams were constructed of different kinds of balloon fabrics to show the effect of differences in the character of the surfaces on the holding power of the seam. The same sample of high-grade balloon cement was used in all of these seams. They may be described as follows: (1) Cloth cemented to cloth (CC), (2) rubber cemented to cloth (RC), (3) rubber cemented to rubber (RR), (4) rubber cemented to an aluminized surface (RA) and (5) aluminized surface cemented to an aluminized surface (AA). These seams were subjected to the test described above after permitting them to set for a suitable time. Table 1 gives the average of a number of determinations of the time required to break under a tension of 1 kilogram per inch of width at 55°C. Figures 6 and 7 which give the variation in the times required for the seams to break under different loads and at different temperatures, show graphically the relative strengths of some of these seams. They rank clearly in the following order, the strongest being placed first:

(1) Aluminized surface cemented to aluminized surface.
(2) Rubber surface cemented to aluminized surface.
(3) Rubber surface cemented to rubber surface.
(4) Cloth surface cemented to rubber surface.
(5) Cloth surface cemented to cloth surface.

This order and practically the same relative strengths were found to hold both when the seams were tested within 24 hours after they were made and also several weeks later. It is apparent from Figs. 6 and 7 that the relative strengths will vary somewhat with the conditions of test; this point will be disclosed in a succeeding section.

Table 1

RELATIVE STRENGTH OF SEAMS MADE BY CEMENTING DIFFERENT SURFACES TOGETHER

Seam No.	Description	Average time required to break at 55° C under a constant load of 1 kilogram per inch.
1	Cloth cemented to cloth...	7 minutes
2	Cloth cemented to rubber..	10 minutes
3	Rubber cemented to rubber	30 minutes
4	Rubber cemented to aluminized surface.....	100 minutes
5	Aluminized surface cemented to aluminized surface	400 minutes

2. *Essentials of good construction.*—The load on a cemented lap in an inflated balloon is almost entirely a shearing stress caused by the surface tension which results from the pressure of the gas in the envelope, and the weight on the suspension. This condition has been duplicated in the tests made by subjecting the test pieces to direct tension along their length, thus making the stress in the cement film a shearing one. Since there is no tensile force tending to pull the seams apart perpendicular to the fabric, the film having the greatest shearing strength is the most desirable.

For this reason as thin a coat of cement as is feasible to apply and insure complete adhesion to both surfaces is the strongest. Both the characteristics of the surface and the quality of the cement may defeat this purpose. If the cement is thick and lumpy great difficulty is experienced in getting a smooth coat and in securing complete wetting of the surface. If the surface is rough, the film is not maintained uniformly thin, even when spread smoothly. Rubber is comparatively inelastic and suffers shearing deformation easily. This deformation is particularly large in thick films and the load is consequently thrown onto the thin places, which give way under the unequal distribution of the load. The stress is then carried by the next thinnest place and so on until the lap slips apart. A smooth surface is also desirable because small irregularities may form cups which the cement bridges with a film and the consequent poor adhesion may result in the finished lap and a considerable portion of the cemented area not bearing its share of the load.

The actual physical properties of the surface are also of importance. Good adhesion is not secured if the surface is not wetted thoroughly by the cement. This purpose is defeated in the case of rough surfaces, as pointed out above. The presence of grease or dust on the surface also prevents the cement from adhering properly. For this reason, seams which receive a preliminary washing with benzene show somewhat higher strength than when the washing is omitted. Even in the case of very smooth, clean surfaces, however, adhesion may not be perfect because the cement may be separated from the surface by a thin film of air which will be detrimental to the strength of the seam.

A study of the microsections, Figs. *1*, *2*, *3*, *4* and *5*, demonstrates the validity of these assumptions regarding the factors contributing to strength. The aluminum to aluminum seam (Fig. 1), which is the strongest of any experimented with, shows a remarkably smooth thin film in which adherence to the aluminized surface is practically perfect, and which is free from thick places, bare spots and other imperfections. At the other end of the scale is the cloth to cloth seam, which presents a vastly different appearance. The cement film is very irregular and varies widely in thickness and closeness of adhesion from place to place. The other types of construction show characteristics ranging successively between these two extremes, none being so markedly poor as

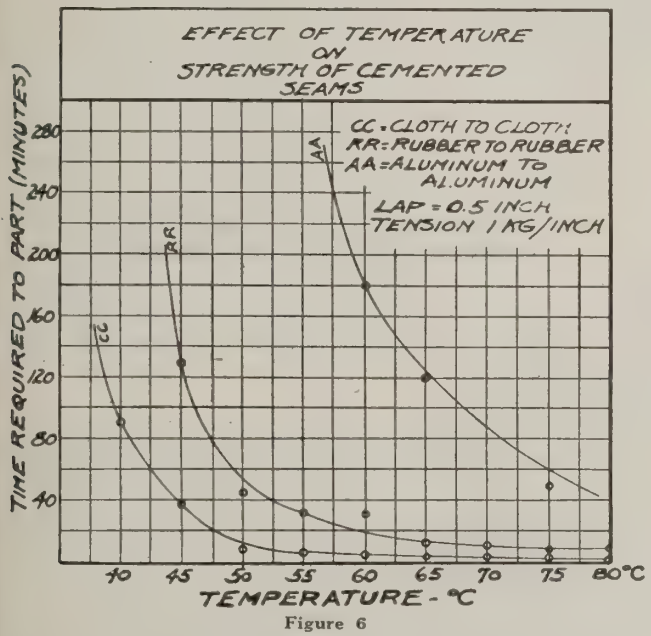


Figure 6

the cloth to cloth and none so good as the aluminum to aluminum seam.

To be sure of a strong seam, therefore, one must have a smooth, clean surface which will wet easily with the cement. The cement must be applied smoothly and evenly and the lap pressed firmly together before too dry.

(3) *Cements.*—In addition to the character of the surfaces cemented together, the kind of cement used also has a considerable effect on the strength of the seam produced. This is in the last analysis the determining factor, for as pointed out above, the seam fails in shear and the elastic properties of the cement determine the amount of shear even though the uniformity, adhesion and thickness of film modify the result. The best grades of balloon cement are

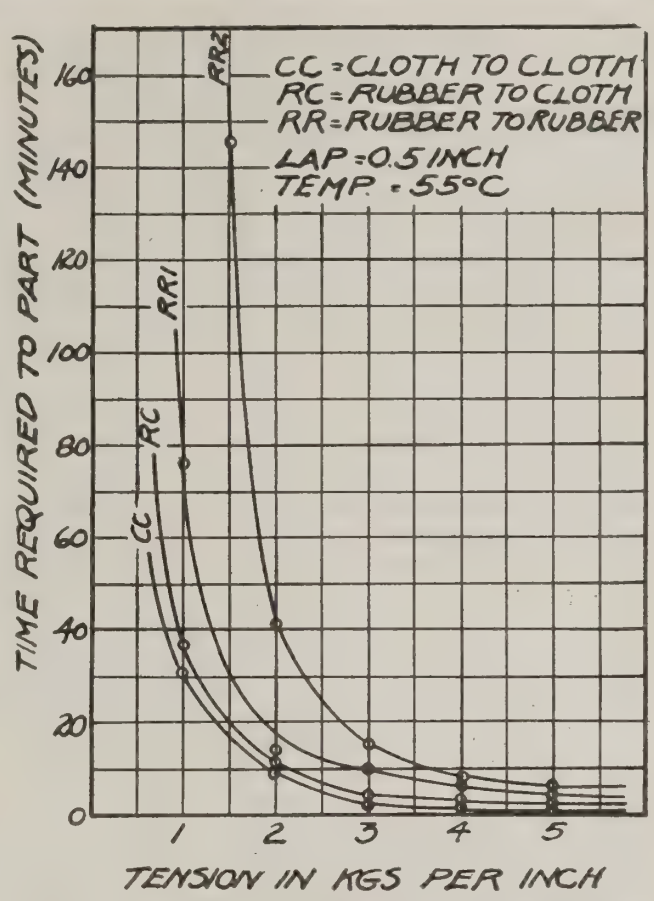


Figure 7—Relation of load to holding power of cemented seams

made by dissolving new rubber in benzene and thoroughly kneading the mass in a dough mixer. The finished cement must be smooth, free from lumps and thin enough to spread easily and smoothly on the surface to which it is to be applied.

Tests were made with two grades of commercial balloon cement, one grade of self vulcanizing tire cement, and one rubber cement made up by dissolving old raw rubber in benzene and mixing by hand. Seams were made with these cements by cementing two rubberized surfaces together; the results are comparable with the seam described in Table 1 as rubber to rubber (RR). The results of tests on these four cements are given in Table 2.

Table 2

RELATIVE HOLDING POWERS OF CEMENTS

Seam No.	Cement	Average time required to break at 55° C; lap = 0.5 inch; tension = 1 kg. inch
1	Old raw rubber dissolved in benzine; mixed by hand...	3 minutes
2	Balloon Cement; Manufacturer A.....	9 minutes
3	Balloon Cement; Manufacturer B.....	30 minutes
4	Self vulcanizing tire cement..	160 minutes

III. Testing Methods

The conditions of test have an important effect on the apparent strength of the seam, as would of course be expected. It is important therefore, that the conditions that effect the apparent strength shall duplicate, as far as possible, the conditions of service. For example, the tests were made under constant tension because the seams are under constant tension in a balloon. A load of 1 kilogram was used because it is at least of the same magnitude as the loads the seams may bear in service. Temperatures above ordinary air temperatures were used because of the increase in temperature of the balloon fabric when exposed to sunlight. In fact most seam failures occur when the fabric becomes "over-heated."

The effects of variations in the load, temperature of fabric

and width of lap were found by suitable tests in order that the conditions of test might be intelligently selected.

Effect of Temperature upon Strength of Seam.—As pointed out above, the failure of seams usually occurs when the laps have become overheated. In kite balloons with outside coatings of dyed or pigmented rubber, fabric temperatures of 25° to 35°C above air temperature are not uncommon during the summer. The temperature rise in the case of aluminized fabrics is somewhat less. To duplicate the conditions of service it was necessary therefore to make tests at a higher temperature than ordinary room temperatures, and 55°C was chosen as representing a fair point at which to make determinations of the relative strengths of the various types of laps. The effect of temperature on the time required to part was investigated in detail, however, to determine the variation in strength due to differences in temperature.

Seams were made up in the usual manner and placed in a constant temperature air bath under a tension of 1 kilogram per inch of width, and the time required for the seam to break at temperatures from 45°C to 80°C at 5 degree intervals was determined. Figure 6 shows graphically the relation between the temperature and time of break for three different types of seams. These all have the same general shape and all show a critical temperature region below which the strength of the seam is nearly a linear function of the temperature, the strength increasing rapidly as the temperature decreases. In this region there is presumably a transition from vicious to plastic flow; above this temperature the ordinarily plastic rubber becomes in effect a more or less viscous fluid depending on the temperature attained, and the lap parts very quickly. This transition point is not clearly marked, however, and is observed by variations in the strength of adherence of the cement to the different types of surface. In the case where the aluminized surfaces are cemented together, the time of breaking is more nearly a linear function than with the other types, which indicates very close adhesion to the aluminum surface, so that even when the viscous state is reached the time required to part is still quite high.

The extraordinary strength of cemented laps at ordinary temperatures is shown in Table 3. Pieces of three seams made up as described in the table were suspended under a tension of 25 pounds per inch of width at ordinary room temperature, which was between 25°C and 30°C. The best of these seams showed no tendency to slip during long periods of test. The method of test, while it shows the strength under ordinary conditions, does not duplicate the conditions of service and was abandoned for that reason.

Table 3

TEST OF SEAMS AT ROOM TEMPERATURE, ABOUT 25° C

Seam No.	Construction	Time required to part. Lap 0.5 inch; tension 25 lbs. per inch	
		1st Test Piece	2nd Test Piece
H	Rubber to aluminized surface; washed with benzine	Over 68 hours	Over 50 hours
I	Rubber to aluminized surface; untreated.....	13 hours	Over 50 hours
J	Cloth to cloth; rubber and aluminum surface buffed off with wire brush.....	48 minutes	71 min.

Note.—Seam I on first test piece showed a slight imperfection at the center of the lap where adhesion was not complete.

Tension.—In practice the load on a cemented lap may average about 1.5 kilogram (3.3 pounds) per linear inch. For testing purposes therefore, 1 kilogram per inch was chosen as a fair value. Tests were made, however, to determine the effect of different tensions on the apparent strength of seams. Figure 7 shows the variations of breaking time with loads of from 1 to 5 kilograms per inch at 55°C. A study of these curves shows that for loads above 2 kilograms per inch there is little difference in the time required to break for the various types of seams, so that, for testing purposes, loads below this value must be used to show the true variations in strength with different types of surfaces and cements.

Width of lap.—It is obvious that increased strength can be obtained by increasing the width of lap. This increase in strength is not a linear function, but increases roughly as the cube of the width of lap at small widths and even faster with wider laps. This is to be expected since the slipping apart is a gradual process dependent on the giving way one after another of the infinitesimal points of contact and when we have a wide lap we not only have more points of adhesion, but less stress is also put on each element of the cement film. This corresponds to a decrease in load and the slipping goes on much more slowly at the lighter loads, the decrease bearing much the same relation to the lap as that shown in our load curves (see figure 7). Figure 8 shows the relation between lap and

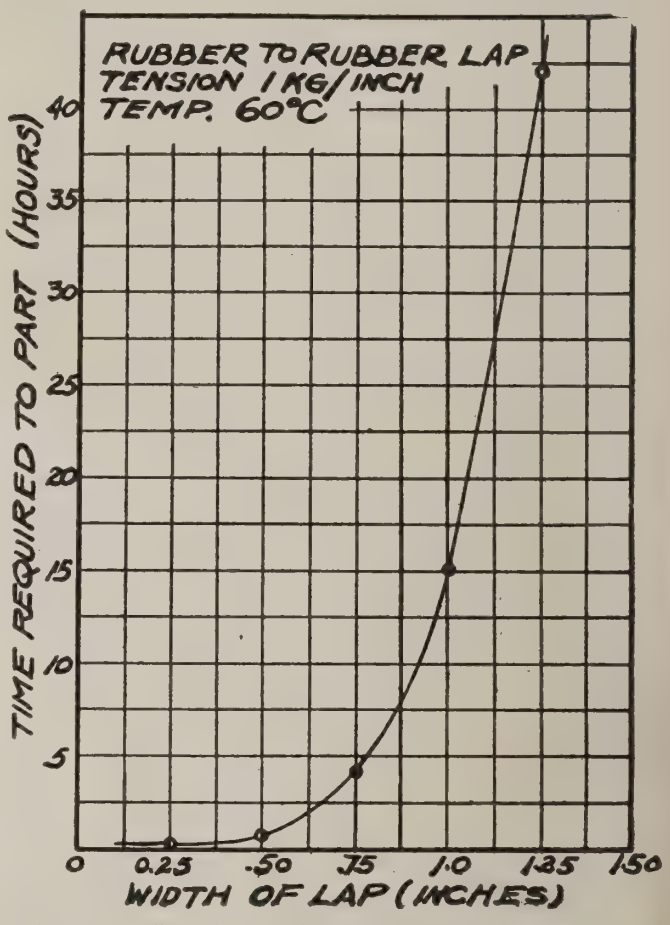


Figure 8—Effect of width of lap on strength of cemented seams

time required to part for five widths of lap. These tests were made at 55°C. with the seams under a tension of 1 kilogram per inch.

(4) *Coats of Cement.*—The evidence on the effect of varying the number of coats of cement is conflicting. This is to be expected since definite amounts of rubber cannot be spread when the material is merely brushed on by hand. It is essential, of course, to get sufficient rubber on the surface to give a continuous film all over it. Once this is done the addition of more of the material only serves to weaken the seam, since it allows more shearing deformation to take place when the load is applied. For most rubberized fabrics two coats are essential and sufficient. For aluminized fabrics one coat, if properly applied frequently gives quite as good a holding power as two coats and certainly better than three.

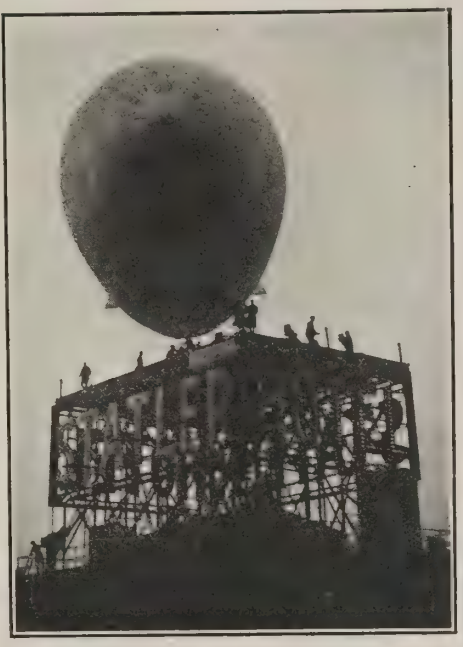
IV. Summary

We have shown by tests and the examination of microsections of cemented seams what the essentials of good seam construction are. A good seam requires, first of all, a good cement. Next the surfaces to be cemented should be smooth and cleam and easily wetted by the cement. The cement should be applied in a thin coat of uniform thickness; two coats are usually sufficient. The strength of the seam will be profoundly influenced by the character of the cemented surfaces. The variations in the strength with change in temperature, load and width of lap have been shown graphically. The methods of testing are described and the significance of different conditions of test is discussed.

DINERS TRAVEL VIA AIR ROUTE

A NEW era has been inaugurated in the aeronautic world in the wonderful performance of the first dirigible balloon built for the United States Army during the recent war—the A-4. This big airship, of the type familiarly known as "blimp," with Army Civilian Pilot James Shade at the wheel has just made the trip from the Wingfoot Lake Air Station, near Akron, Ohio, to Cleveland, landing on the roof of the Statler Hotel, discharging two passengers and immediately returning to its hangar 50 miles distant. This is the first time in the history of aeronautics in America that any type of aircraft has been brought to a quick and convenient stop in the heart of a large city for the purpose of landing passengers.

The occasion was the meeting and dinner of the Cleveland Section of the Society of Automotive Engineers at this hotel, at which Ralph H. Upson, chief aero engineer of the Goodyear Tire & Rubber Company, and Major C. H. Maranville, commander of the Army Aircraft Detachment at Akron and Wingfoot Lake, were speakers.



The successful landing on the roof of Hotel Statler



James F. Shade, who piloted the airship

Upson, who is the world's champion balloonist, having won the last great International Balloon Race at Paris, France, with R. A. D. Preston acting as aide, in a wonderful 500-mile flight, conceived the idea of making the trip in a dirigible, and with the full co-operation of the army officers of the dirigible school at Akron, who arranged all details, was able to carry out the project.

Glenn L. Martin, the noted inventor and pioneer manufacturer of aeroplanes, and one of the country's noted aviators, was the first to greet and congratulate the two passengers as they stepped from the car.

To the thousands of interested spectators of this history-making event the conclusion was inevitable that commercial dirigible navigation is almost upon us.

The performance was not staged as a "stunt," but to show the progress that has been made in the development of dirigibles and the skill with which difficult landings can be made by experienced pilots.

Army officers are delighted with the success of the undertaking. "We gladly entered into the spirit of the affair with the view of stimulating enlistments in the army airship training service at Wingfoot Lake," declared Major Maranville, who was officially in command of the A-4 on this memorable trip. "The demonstration proves beyond doubt that the airship is practical and that young men that enlist in this service have a wonderful future before them. We were glad to be able to point out that the dirigible has a commercial as well as a military value."

The piloting of James F. Shade on this occasion was pronounced by both army and civilian aeronautical engineers as the most skillful they had ever seen, and stamps him as one of the best dirigible pilots in America. The vast throng that witnessed his work in landing on the hotel roof, apparently realized the difficulties he was overcoming in this pioneer effort and broke into tumultous cheering as he guided the car of the dirigible to the center of the small improvised platform, erected on the electric sign for this purpose.



Ralph H. Upson, chief aero engineer, Goodyear Tire & Rubber Company



The Army dirigible A-4

The AIRCRAFT TRADE REVIEW

Propellers for NC Planes Were Two-day Rush Job

Baltimore, Md.—An example of the rapid work and efficient service of the American Propeller Company of Baltimore is afforded by the handling of the contract for the propellers for use on the NC squadron.

At the American Propeller Company's works one Saturday afternoon shortly before the start of the first stage of the flight, while the force was getting ready to quit and enjoy the holiday, when Washington rang in on long distance and a dozen propellers for the great flight were demanded in the shortest possible time. Lieutenant George S. Murray, of the Bureau of Steam Navigation, U. S. N., which had the matter in charge, was already on his way to Baltimore with drawings and specifications. The whole force of the Propeller Company was assembled and work began at 1 p. m., and through that night and Sunday was continued without break. At 7 p. m. Sunday the 12 propellers were made and varnished. A day was required for the varnish to dry, and on Monday night in a special baggage car, with Lieutenant Murray beside them, the propellers started for Boston; on arrival there early Monday morning by special trucks they were taken to the fast torpedoboat destroyer Edwards, waiting with steam up; the hatches were found too small to take the propellers below, and they were lashed on deck and the boat, under forced draft, started for Trepassey bay.

These Baltimore-made propellers were delivered at this far-off Newfoundland point on the afternoon of Wednesday, May 14, four days from the time of their being ordered.

The propellers were of the ordinary two-blade type, 10 feet in diameter, and were for the three tractor engines of each plane to pull a gross load of 28,000 pounds at an expected speed of 85 miles an hour.

The company received the emcomium of naval officials for the efficient handling of the contract.

Albuquerque School Moves to Wichita

Wichita, Kans.—The company which organized the aviation school at Albuquerque, N. M., has organized a $25,000 corporation at Wichita. Their equipment is being moved to this city because the high altitude at Albuquerque made it unsafe for instruction purposes.

The Board of Commerce of Wichita is co-operating with the company in the establishment of a first-class landing field under government specifications. Regular passenger trips between Wichita, Kansas City and Tulsa, or any point within 250 miles' radius will be established where the demand warrants. The school's equipment consists of five aeroplanes and instruction in flying, wireless, astronomy and meteorology will be given by the faculty.

Air Travel Firm Formed

An aeroplane transportation company has been organized to link up Detroit and Cleveland by direct air route over the Detroit River and Lake Erie. Daily trips, weather permitting, will be made each way, the planes leaving at 9 o'clock in the morning.

The commercial enterprise has been undertaken by the Universal Aviation Company, and is backed by many prominent Detroit and Cleveland automobile manufacturers. H. M. Leland, of Detroit, who was former president of the Cadillac Motor Car Company and now president of the Lincoln Motor Company, and E. E. Allyne, president of the Aluminum Casting Corporation of Cleveland, are heading the project as president and first vice-president, respectively. H. D. McCullough is secretary and treasurer of the company.

John T. Patterson, the general manager of the company, has come here to engage additional pilots and to arrange for the shipping of five aeroplanes. He announced that the first flight would be made, if possible, on June 10. Passengers, he said, will be charged $50 for a one-way trip. Express packages will be carried for 32 cents per pound, and mail 2 cents an ounce. He points out that although Cleveland and Detroit are but 80 miles distant the fast express trains take eight hours to make the trip, for the reason that a detour by way of Toledo around the southern end of Lake Erie is necessary.

Two aviation fields with hangars and buildings have been established in Detroit. One is opposite Belle Isle, just east of the bridge, and another at Morrow Field. It is planned to operate training schools for aviators on these aerodomes as well as another at the flying field in Cleveland.

Dixie Flying School Organized

Birmingham, Ala.—The first Civilian Flying School to be organized on a large scale in the South since cessation of hostilities has been completed here with the issuance of a charter to the Dixie Flying Corporation. Under the terms of the charter the company will conduct a large school for civilians and will include in the course a complete ground school of instruction. Standard Army Training planes will be used in the training. The company will in addition handle an extensive line of aeroplanes, including a full stock of parts, and will keep open at Birmingham at all times a service field for any planes that might come that way.

The company is the largest, both from a point of financial backing and actual holdings of fields, planes and all equipment for training yet organized in the United States, it is believed. Scores of men have already been employed in completing the preliminaries and by the opening some thirty days from now the Dixie Flying Corporation will employ more than 100 persons, including instructors, mechanics, clerical, field officers and other personnel such as salesmen, stock foremen.

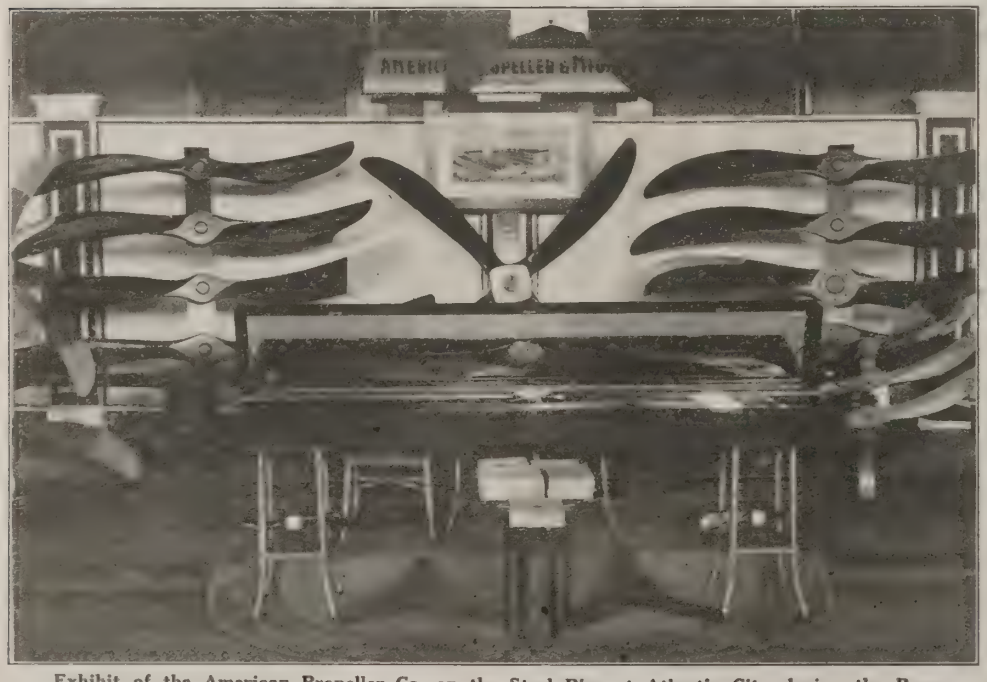


Exhibit of the American Propeller Co. on the Steel Pier at Atlantic City during the Pan-American Aeronautic Convention

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative



PILOTS

Dana C. DeHart
Edward V. Gardner
Ira O. Biffle
Leon D. Smith
Gilbert G. Budwig
Trent C. Fry

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

PILOTS

E. Hamilton Lee
Lester F. Bishop
Carroll C. Eversole
John M. Miller
Charles E. Bradley
Max Miller
Frank McCusker

Chicago-Cleveland Air Route Shows High Efficiency and Reliability

The Chicago-Cleveland Air Mail Service during its first half month has made a daily 100 per cent. performance except two half trips, May 21, when the field at Bryan, Ohio, was so flooded that the planes could not rise from the ground.

Out of a possible mileage of 11,050, a total of 10,725 was run, making a performance of 97.1 per cent. A grand total of 408,560 letters were carried in the first half month of this service. In the operation of the Cleveland-Chicago Air Mail the greatest forward step in cross country work has been taken in that since May 21 the daily trips in each direction are about 325 miles non-stop. Twenty such non-stop trips were made without motor trouble of any kind, and with a single mishap in the nature of a fire in the pilot's cockpit of a plane operated by Pilot Frank McCusker, resulting in the death of that pilot. This has been the only fatality to any pilot carrying the mail since the service was established, May 15, 1918.

The remarkable long distance, non-stop flights on the Chicago-Cleveland route are being performed by the De Haviland planes strengthened for cross-country mail carrying and equipped with low compression Liberty motors. The best time made on any trip between Chicago and Cleveland was 2 hours and 42 minutes for 325 miles, and the longest trip was 4 hours, due to a bad headwind. The average speed for the half month was 98½ miles per hour, and the average gas consumption was 23⅕ gallons per hour. The mail leaves Cleveland and Chicago at 9:30 o'clock each morning, including Sundays, and arrives at its destination usually between 12 and 1 o'clock in the afternoon.

Aerial Mail Service for the Philippine Islands

Among the plans for aerial mail services with which forward-looking people are busy in various parts of the world, one which has promise of realization within a reasonable time because of the comparative simplicity of the practical problems to be solved is that of an aeroplane mail connecting important points in the Philippine Islands—as Manila to Cebu and Manila to Iloilo. The distance in each case is well within the limits of a non-stop aeroplane flight, and is yet sufficiently great to make the saving of time over that of the steamship mail routes a controlling factor in the choice. While nothing very definite seems to have been done as yet toward putting such mail routes into existence, the Director of Posts for the islands, José Topacio, is considering various recommendations from aeroplane and flying experts, and recommendations on the subject to the Philippine Legislature may follow.

Concrete proposals for a mail service to various points within flying radius of Manila have also, according to the Manila press, been presented to the authorities by H. J. Folsom, lately an officer in the United States Army Air Service, and an instructor at various flying fields during the war. A Manila paper quotes Folsom as follows:

"It is in the lightly populated regions and in island commerce that we all look forward to the most rapid development in commercial flying. There are in China and in other parts of the Orient many important commercial centers which cannot be linked with neighboring centers by rail owing to the mountains, jungle or water. In such inland regions rail lines depend largely on the business continuously along the line for their support, and a long barren stretch can often render a rail line inadvisable, even though the terminals might offer large inducements. Railroading under such physical conditions is very expensive, but an air service does not depend on interterminal business. Therefore airmen generally believe that air routes are the solution of many problems similar to that of island communication in the Philippines."

Salvage Motors and Aeroplanes to be Sold to Public

Those contemplating the purchase of a Government aeroplane or motor, can write the Salvage and Sales Branch, Air Service, 6th and "B" Streets, Washington, D. C., and have their name entered on the list to be advised when the opportunity arrives for them to make a purchase. Detailed information furnished on request.



One of the Curtiss J.N.4-H Mail Aeroplanes with a 150 H.P. Hispano-Suiza engine. The mail compartment is situated at the center of gravity. The markings on the side of the fuselage indicate that it has a maximum carrying weight of 3,500 pounds

NAVAL and MILITARY AERONAUTICS

Commander Towers Ordered to Duty With Commission for Air Terms

Washington, June 6.—Commander John H. Towers, Flight Commander of the Navy Transatlantic Seaplane Squadron, was relieved of all duty with that squadron on June 6 and assigned to service with the Commission for Air Terms now sitting at Paris.

One Hundred Nieuports to Be Shipped to United States

Washington, D. C.—According to an official statement, it is estimated that 100 Nieuport-28 aeroplanes will be available for shipment to the United States as the result of settlements with the French.

New Naval Dirigible C-8 Flies 450 Miles in 8 Hours

Cape May, N. J., June 3.—The U. S. Navy Dirigible C-8 arrived here after a 450-mile flight from Akron, Ohio, which was accomplished in a flying time of eight hours. She passed over Washington at 12:50 p.m., having left Akron at 6 a.m., and arrived at Cape May at 6:15 p.m. Over the mountain region she made 47 miles an hour.

The C-8 has just been completed. It is the largest non-rigid dirigible yet built by the navy. It was in command of Lieutenant Commander Paunack. With him were Lieutenant Laurence and Lieutenant Larned, U. S. N. R. F., and Gunner Anthony and Machinist Mates Keller and Crampton.

Major Cushman Hartwell Returns to Washington to Become Executive Officer of Information Group

After six months spent in Siberia, Major Cushman Hartwell has returned to Washington and taken up the duties of executive officer in the office of the Information Group. Before going overseas Major Hartwell was executive officer of the Training Section.

Capt. Craven Recommends Retention of All Naval Air Stations to House Naval Committee

Washington, D. C.—Retention of all naval air stations now in operation was recommended to the House naval committee on June 5 by Capt. Craven, director of naval aviation. He declared the stations were necessary to maintain the present efficiency of the service.

Capt. Craven also recommended an appropriation of $6,500,000 for three dirigibles, one of which would be purchased from Great Britain at a cost of $2,500,000. Other appropriations requested included $3,933,000 for the marine corps air service, stations for which would be maintained at Quantico, Va., and Paris Island, S. C.

New Reserve Military Aviators

The following named officers, having completed the required tests, are rated as Reserve Military Aviators: Second Lieutenants John Blaney, Floyd P. Roberts, Charles S. Wages, First Lieutenant Harry A. Dinger, Captain Elmer E. Adler, A. S.

Col. Fuller Presents $30,000,000 Estimate for Plane Construction to House Committee

Washington, D. C.—In speaking before the House Committee on Military Affairs on June 4th Colonel Fuller submitted estimates of $29,722,500 for the construction of aeroplanes and equipment. Of this amount he said there was an item of 650 planes at a total of $17,625,000, one of Hispano-Suiza motors at $7,325,000, and one for the purchase of pursuit planes for Hawaii, the Philippines and the Canal Zone at $4,312,500. The purchase and construction program also called for an appropriation of $3,074,000 for airships, including one semi-rigid, nine non-rigid and one rigid dirigible. The rigid ship, he said, would be purchased from the British government, it being an exact duplication of the latest British dirigible, 692 feet in length and with a capacity of 2,000,000 cubic feet. This data was furnished by General Mitchell, who strongly advocated the inclusion of this item in the budget, explaining that the British had found themselves seriously handicapped during the war through a need for this type of ship. An item of interest to the committee was one for $100,000 for the training of Reserve officers in summer camps, this being the first appropriation asked for the purpose of paying and transporting Reserve officers.

Navy Has 1,000 Flying Boats and 700 Training Planes

Washington, D. C.—According to statements made by Captain Craven of the House Military Affairs Committee, the flying equipment of the Navy Department consists of 1,051 large flying boats and 763 school 'planes.

War Department Renews Lease on Wilbur Wright Field

Washington, D. C.—The War Department has renewed the lease on Wilbur Wright Field for use as a permanent storage and training depot. The tract comprises 1,100 acres.

No Civilian Training Camps This Year

Washington, D. C.—An official statement issued by the War Department announces that owing to lack of funds and uncertain conditions training camps for civilians are not contemplated this year.

Air Service Officers Discharged

Washington, D. C.—The following officers of the Air Service have recently received their discharge: Captain Herbert E. Ives, Second Lieut. Herman G. Oliver, Maj. Edward P. Curtiss, Second Lieut. Gilbert D. Deere, First Lieut. William H. Harris, Jr., Capt. Robert C. Disque, First Lieut. Edward Schoeppe, Second Lieut. DeWitt F. Ottman, First Lieut. Robert Steinberger, Second Lieut. Charles H. Dauphin.

Reserve Officers to Receive Credit for Active Service

Washington, D. C.—The War Department authorizes publication of the following information:

The Secretary of War is submitting to the chairmen of the Committees on Military Affairs, of the Senate and House of Representatives a draft of a proposed joint resolution to make it possible that members of Reserve Officers Training Corps shall receive credit for active service in the army or for special training received during the period of the emergency. It is proposed that the amount of such credits be determined by regulation to be prescribed by the Secretary of War.

Demobilization of Air Service

According to reports received from the Air Service, the net decrease in the total commissioned and enlisted strength from the date of the armistice to May 22 was 78 per cent.

The following table shows the present distribution of personnel, as compared with the figures for November 11, and per cent of net decrease. The May 22 figures do not include 332 officers and 3,047 enlisted men on detached service or at camps awaiting discharge.

	Nov. 11	May 22	Per cent net decrease
Cadets	6,483	259	96
Enlisted men	170,436	37,329	78
Officers	20,852	5,076	76
Total	197,771	42,664	78

During the week ended May 22, 1919, the decrease in the Air Service personnel overseas was 1,186, as against a weekly average of 3,570 for the three preceding weeks.

The strength of the Air Service in the U. S. and overseas on November 11 and May 22 was:

	United States	Overseas
Nov. 11	119,882	77,889
May 22	15,580	27,084

Reserve Military Aviators Appointed

Washington, D. C.—The following named officers, having completed the required tests, are rated as Reserve Military Aviators: Capt. Horace Green, First Lieut. Armin F. Herold, Second Lieut. Bruce Cleveland, Second Lieut. Harold S. Purdy, Second Lieut. Ernest Goodrich, Second Lieut. Wayne V. Pittman.

Recent Naval Orders

Lieut. Com. Robert A. Lavender, to post graduate instruction in radio engineering.

Lieut. (junior grade) William Vanderbilt, Jr., to duty Naval Air Station, Rockaway Beach, L. I., N. Y.

Lieut. (junior grade) Braxton Rhodes, to duty Naval Aviation Detachment, Langley Field, Va.

Lieut. Willis B. Haviland, to duty Naval Aviation Detachment, Langley Field, Va.

Lieut. (junior grade) Braxton Rhodes, to duty Naval Air Station, Rockaway Beach, L. I.

Lieut. Com. Newton H. White, Jr., to command Naval Air Station N. O. Base, Hampton Roads, Va.

Lieut. Leman L. Babbitt, to command Naval Air Station, Montauk, L. I., N. Y.

Capt. Stanley V. Parker, to Naval Air Station, Pensacola.

Lieut. Edwin S. Parsons, to duty Naval Air Station, Rockaway Beach, N. Y.

New Insignia for American Aircraft

Washington, May 24.—The distinguishing insignia on American aircraft has been changed by order of the War and Navy Departments and will hereafter be a red circle inside of a white five-pointed star inside of a blue circumscribed circle. The circumference of the inner circle will be tangent to the lines forming a pentagon made by connecting the inner points of the star. The inner circle will be red, that part of the star not covered by the inner circle, white, and that part of the circumscribed circle not covered by either the inner circle or star will be blue.

The insignia is to be placed on the upper and lower surface of the upper and lower planes of each wing so the circumference of the circumscribed circle will be tangent to the outer tips of the planes. One point of each star must be pointed directly forward and the diameter of the insignia which can be either painted on or applied by decalcomania transfer, must be 60 inches.

The rudder insignia will be three equally wide bands, red, white and blue. Both sides of the rudder, in the rear of the rudder post, will be striped parallel to the vertical axis of the plane, with the blue stripe nearest the rudder post, the white in the center and the red at the tail of the rudder.

Special Orders Nos. 123-129 Inclusive

So much of par. 213, S. O., No. 46-O, Feb. 25, 1919, War Department, as rates the following-named officers as military aviators, from the dates indicated in that order, is amended so as to rate such officers as military aviators to date from Feb. 24, 1919: Lieut. Col. William Thaw, Maj. David M. K. Peterson, Capt. Douglas Campbell, Capt. James A. Keating, Capt. Reed G. Landis, Capt. Edward V. Rickenbacker, First Lieut. William P. Irwin, First Lieut. E. W. Springer, Second Lieut. John O. Donaldson.

So much of par. 37, S. O., No. 48-O, Feb. 27, 1919, W. D., as rates the following-named officers as junior military aviators from the dates indicated after their names is amended so as to rate such officers as junior military aviators to date from Feb. 24, 1919: Capt. James A. Keating, Capt. Edward V. Rickenbacker, Capt. Edgar G. Tobin, First Lieut. Frank Baer, First Lieut. Louis G. Bernheimer, First Lieut. Charles W. Drew, First Lieut. William P. Erwin, First Lieut. Robert F. Raymond, First Lieut. E. W. Springs, First Lieut. George A. Vaughn, First Lieut. Donald D. Warner, Second Lieut. Earl W. Porter.

The following-named second lieutenants will proceed to Camp Pike, Ark.: John D. Goodrich, John H. Madden, Earl D. Sylvia.

Second Lieut. David F. Davis will proceed to San Antonio, Tex., reporting to the Aviation general supply depot.

Capt. Hugh M. Pierce will proceed to Washington, D. C., and report to the Director of Air Service.

Second Lieut. Max V. Doten will proceed to Aberdeen Proving Grounds, Aberdeen, Md., and report to the commanding officer of the 271st Aero Squadron.

Capt. Clarence B. Hammond, Air Service, will proceed to New York City on official business in connection with the employment of discharged soldiers, and upon completion of the duty enjoined will return to his proper station at Washington, D. C.

The following-named officers are relieved from duty in the office of the Director of Air Service, and are assigned to duty at Bolling Field, Anacostia, D. C.: Second Lieuts. Nathan P. Oakes, Mark A. Hamilton, Clayton C. Shangraw, Patrick M. Logan, Estell H. Rorick, Philip D. Lucas, Otis L. Gilmore, Charles R. Dauphin, Ernest E. Harmon, Lyman Patterson, James E. Adams, Edward J. Sullivan, Jr., Grisson E. Haynes, Herbert E. Metcalf, Roland L. Spencer, Raymond P. Birdsall, Edward H. Hill.

The following-named officers are relieved from duty in the office of the Director of Air Service, and are assigned to duty at Bolling Field, Anacostia, D. C.: Lieut. Col. Rutherford S. Hartz, Maj. William M. Conant, Capt. Eugene C. Braig, Capt. Roy R. Showalter, Capt. Felix Steinle, Capt. George B. Hoagland, Capt. Henry E. Reece, Capt. Benni Goldblatt, Capt. Carl Crosse,



First Lieut. Shoptaw, pilot and "Jimmy" Shade, assistant pilot of the Army dirigible A-4, which landed on the roof of Hotel Statler recently

First Lieut. Ray A. Dunn, First Lieut. Edward B. Preis, First Lieut. Lotha A. Smith, First Lieut. Marshall S. Boggs, First Lieut. Robert H. Ellis, First Lieut. Leo F. Post, First Lieut. Charles W. Lamborn.

Second Lieut. Landreth M. Harrison, now on sick leave, will proceed to Fort Snelling, Minn., and report to General Hospital No. 29.

Second Lieut. Herbert S. Sawyer, now a patient at General Hospital No. 2, Fort McHenry, Md., will proceed to Hazelhurst Field, Long Island, N. Y.

Second Lieut. Herbert R. Kendall, now at General Hospital No. 2 Fort McHenry, Md., is transferred to Letterman General Hospital, San Francisco, Cal.

First Lieut. Edmund A. Clune will proceed by rail, on or about June 3, 1919, from Washington, D. C., to New York, N. Y., thence by aeroplane to San Francisco, Cal., on temporary duty in connection with the Air Service of the Army, for the purpose of taking part in transcontinental flight, and will return by aeroplane, upon completion of this duty, to his proper station, Washington, D. C.

First Lieut. Richard D. Collins will proceed from Rockwell Field, San Diego, Cal., to Washington, D. C., and report to the Director of Air Service.

The appointment on May 28, 1919, of First Lieut. Albert Joshua Clayton, for the period of the existing emergency, to the grade of captain, Air Service, is announced.

First Lieut. William F. Carroll is relieved from further duty in the office of the Director of Air Service, and will report in person to the Chief of Staff for duty with the geographic branch of the Military Intelligence Division.

Lieut. Col. Millard F. Harmon, Jr., now in Washington, D. C., at the expiration of the duty assigned him under par. 2, S. O., No. 65, Panama Canal Dept., May 10, 1919, will report to the Director of Air Service for temporary duty not exceeding 15 days.

Capt. Paul P. Magoffin will report to the Chief of Staff for duty with the Historical Branch, War Plans Division.

First Lieut. Charley Miller will proceed to Camp Dodge, Iowa, and report not later than June 3, 1919, to the commanding general for duty in connection with the rifle matches, 1919, and upon the completion of this duty will return to his proper station.

Second Lieut. John L. Leonard, Aviation Service, now a patient at General Hospital No. 32, Chicago, Ill., is transferred to General Hospital No. 40, St. Louis, Mo.

Second Lieut. William G. Davidson will proceed to Camp Travis, Tex.

Second Lieut. Samuel F. Hurt will proceed to Hazelhurst Field, Mineola, Long Island, N. Y., thence to Fort Hancock, N. J., thence to Little Silver, N. J., on temporary duty; thence to Hazelhurst Field, Mineola, Long Island, N. Y.

Par. 70, S. O., No. 105-O, W. D., May 5, 1919, directing First Lieut. William J. Doyle to proceed from Buffalo, N. Y., to Washington, D. C., is amended so as to direct him to proceed from Buffalo, N. Y., to Taylor Field, Montgomery, Ala.

By direction of the President, the following-named officers of the Signal Corps are relieved from detail in that corps, to take effect June 2, 1919, and are detailed for service and to fill vacancies in the Aviation Section, to take effect June 3, 1919: Maj. Joseph B. Douglas, Capt. James G. Boswell, Capt. Oscar Westover, Capt. John W. Simons, Jr., Capt. Roy M. Jones, Capt. Ora M. Baldinger, First Lieut. Edwin J. House.

Second Lieut. Peter W. Welch will proceed to Cleveland, Ohio; thence to Dayton, Ohio; thence to Cleveland, Ohio; thence to Hazelhurst Field, Mineola, Long Island, N. Y., for the purpose of testing navigation instruments to be used on transcontinental flight, and upon completion of this duty will return to his proper station, Washington, D. C.

The following promotions for the period of the existing emergency are announced: To be captain, First Lieut. John D. Hartigan. To be first lieutenants, Second Lieuts. Harold Kenneth Atkinson, George W. Rowden, Clarence Herkel Johnson, Frederick Hamilton Lovenberg, Franklin J. Rosemeir, Malcolm E. Schroyer.

First Lieut. Elmo N. Pickerill will proceed to Fort Sill, Okla.

Second Lieut. Robert K. Hall, upon the expiration of his present sick leave, will proceed to Walter Reed General Hospital, Takoma Park, D. C. for treatment.

Second Lieut. Charles R. Colt will proceed to Bolling Field, Anacostia, D. C.

Capt. John A. Macready will proceed to Dayton, Ohio, and report to the Chief Engineering Division, Air Service, for duty.

Maj. Maurice Connolly is relieved from further duty in the office of the Director of Air Service, and will report to Hazelhurst Field, Mineola, Long Island, N. Y.

Second Lieut. George H. Burgess will proceed to Fort Hancock, N. J., on temporary duty, thence to Hazelhurst Field, Mineola, Long Island, N. Y.

Second Lieut. Winfield S. Hamlin will proceed to Hampton, Va., for assignment to the School of Aerial Photography.

So much of par. 213, S. O., No. 46-O, Feb. 25, 1919, W. D., as rates First Lieuts. Merton L. Campbell and Lloyd A. Hamilton as military aviators is revoked.

Capt. Chilion F. Wheeler will proceed to Washington, D. C., on temporary duty not to exceed 10 days, thence to Hazelhurst Field, Mineola, Long Island, N. Y.; thence to San Diego, Cal., on temporary duty; thence to San Francisco, Cal., reporting upon arrival to the general superintendent Army Transport Service, Fort Mason, San Francisco, Cal., for transportation to the Philippine Islands, and upon arrival there report to the commanding general Philippine Department for duty.

Maj. James M. White will proceed to San Francisco, Cal., and report to the General Superintendent Army Transport Service for transportation to the Philippine Islands, and upon arrival at Manila will report to the commanding general Philippine Department.

Second Lieut. Ben B. Ehrlichman will proceed to Sacramento, Cal., and report to the commanding officer Mather Field.

Second Lieut. Rudolph L. Ehrlichman will proceed to Sacramento, Cal., and report to the commanding officer Mather Field.

Second Lieut. Wallace Brown is relieved from further treatment at Hospital No. 2, Fort McHenry, Md., and will proceed to Hazelhurst Field, Long Island, N. Y.

First Lieut. Eugene R. Scroggie is relieved from further treatment at General Hospital No. 2, Fort McHenry, Md., and will proceed to Hazelhurst Field, Long Island, N. Y.

(*Continued on page 702*)

FOREIGN NEWS

Santiago-Valparaiso Aerial Mail Service in Regular Operation

The first regular aeroplane mail service to be maintained in South America is that which operates between Santiago and Valparaiso— the two main centres of population in the Republic of Chile. The Chilian railway system is unsatisfactory, the journey between the two cities occupying some three hours, excluding the wait for half an hour or so which is the invariable rule at the half-way junction of Llay-Llay. For the new mail-carrying service, which has been in successful operation for some weeks, a number of the Bristol monoplanes which were recently presented by the British to the Chilian Government, are employed. The Chilian pilots employed have proved particularly skilled in their work.

No Sales of German Aircraft Permitted

Paris.—General Nudant, on behalf of the Allied Governments, has informed the German Armistice Commission that all sales of German aeroplanes to foreigners are forbidden, and has demanded the immediate steps be taken to put a stop to such sales.

Peace Treaty Delivered by Aeroplane

In order that the Peace Treaty could be in the hands of the German Government at the same time as the terms were formally presented to the German delegates, a Versailles on May 7, a copy was dispatched by aeroplane on the previous day to a Rhine aerodrome, when another machine conveyed it to Weimar.

On a French military machine, the Danish Lieutenant Pauli Krause, accompanied by Lieutenant Sabouret, on May 10 flew from Villacoublay to Copenhagen in 8 hours, carrying a copy of the Peace Treaty to the Scandinavian Governments.

Aerial Transportation in Vancouver

A message from Vancouver, B.C., states that the first aerial transportation company began business there a few weeks ago. A landing ground of 26 acres has been secured, and hangars are being erected. Flights can be made for pleasure or commercial purposes. Three two-seater machines are available, with former members of the R.A.F. as pilots and mechanics.

Conditions of Australian $50,000 Prize

It is stated that the preliminary conditions of the Australian Government's offer of a $50,000 prize for the first Australian airman to fly from Great Britain to the Commonwealth have been arranged at a conference attended by representatives of Mr. Andrew Fisher (High Commissioner for Australia in London), the Royal Aero Club, and the Air Ministry.

The prize, which must be won before December 31, 1920, is open only to Australians in seaplanes, flying boats, or aeroplanes of all-British make. The distance, varying from 15,000 to 17,000 miles, according to the route, must be completed in 720 hours.

Canadian Air Force to Be Disbanded

Ottawa, June 2.—The Canadian Air Force—organized a year ago and made up of two fighting squadrons—soon will be only a war memory. Official announcement of its disbandment is expected to be made by the Government in the near future.

A strong fight has been made to retain some portion of the organization intact, famous Canadian aces like Captain Bishop, V. C., and Captain Barker, V. C., interesting themselves in the proposal; but as the scheme involved an intial expenditre of $10,000,000 the Government, for financial reasons, has decided against it.

The Canadian Air Force was organized upon the insistent demand of the Canadian people that the Dominion should be represented at the front by a distinctively Canadian flying corps. Up to that time, although at least 40 per cent. of the British flying corps was made up of Canadians, Canada had no force of her own.

Madrid to London Flight Made in 12 Hours by DH-4

London.—A British aeroplane flew from Madrid to London recently within 12 hours. The train journey takes about 45 hours.

There were two stops for food and petrol. The route followed represents a distance of 987 miles, or more than half the distance across the Atlantic between Newfoundland and Ireland. The speed works out at about 78 miles an hour.

This magnificent feat was accomplished by Lieutenant-Colonel W. D. Beatty, R.A.F., with Lieutenant G. M. Jeffery, R.A.F., as observer, in a DH-4 military machine with a single 350-h.p. Rolls-Royce Eagle Mark VIII engine.

Colonel Beatty left Madrid at 6.15 a.m. He landed at Kenley aerodrome, near Croydon, at 6 p.m.

The first stop was at Pau, after a high flight across the Pyranees, and the second at Tours, and thence the machine flew direct to Kenley.

Colonel Beatty, who piloted the machine for the whole journey, was formerly at the Air Ministry in charge of the administrative work in connection with the School of Aerial Navigation, and he joined the No. 1 Communication Squadron especially to take part in the flight of the four British machines to Madrid. These flights have been arranged by the Air Ministry for demonstration purposes.

French Firm Builds Large Seaplane

It is probable that the first French machine to attempt a North Atlantic crossing will be a giant hydravion constructed near Bordeaux. Successful trials have already been carried out. It has a span of 23 metres, a length of 13 meters, and a central hull. It can carry 2,000 litres of petrol, and its motive power is a 500 h.p. Sunbeam, turning a four-bladed airscrew. Burrie, a pre-war aviator carried out the trials. It was constructed by Messrs. Bonneville, Musset, Dufau, Caussegne.

London Evening News Uses Regular Aeroplane Delivery

London.—The London *Evening News* is the first newspaper to establish its own aerial delivery. Mr. Sidney Pickles is the first pilot. A Rolls-Royce motored Fairey biplane is used which carries its cargo between Lambeth and Westminster bridges to the east coast.

Air Passenger Service

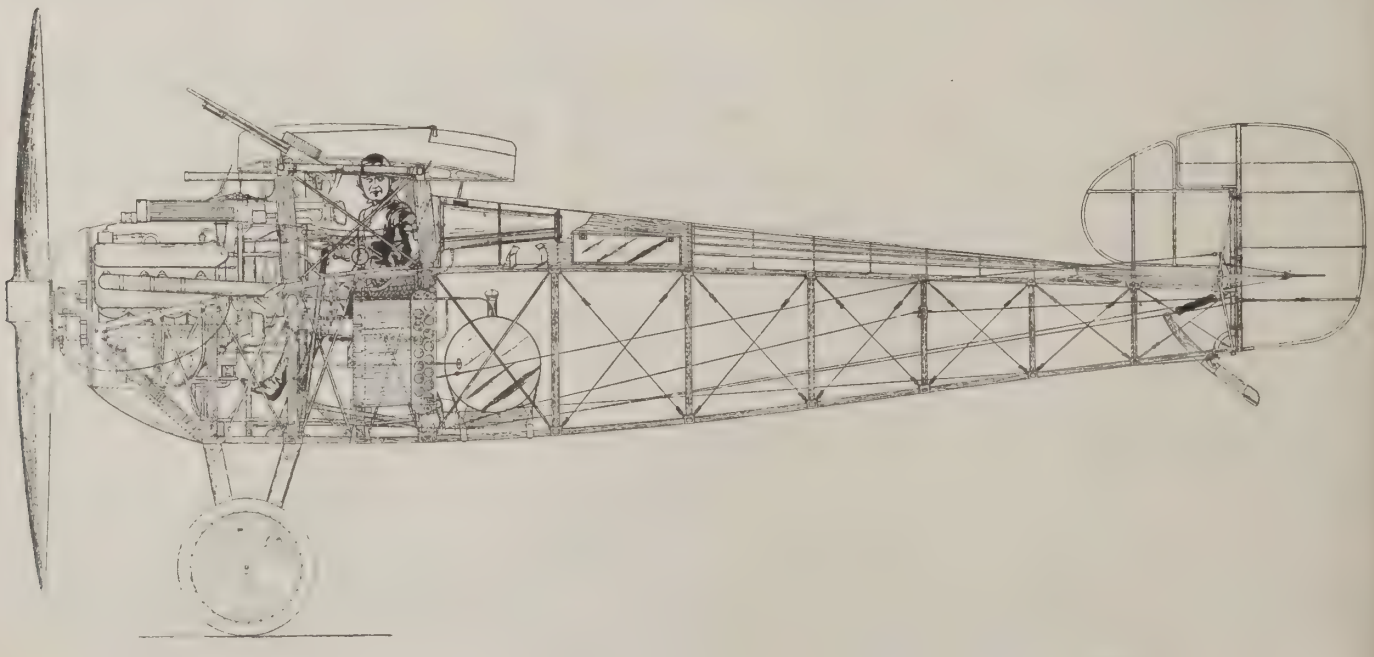
Madrid, May 30.—A company has been formed with Spanish capital to inaugurate a passenger, mail and merchandise aerial service between Madrid and several of the provincial capitals.

R-34 in 21-Hour Flight

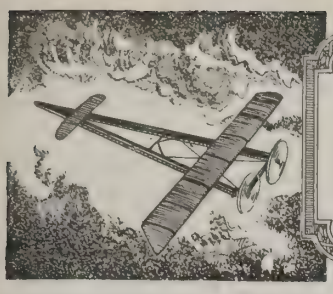
London, June 1.—The airship R-34, after an adventurous trip in the sky extending over twenty-one hours, was able to descend safely at her destination at East Fortune, Haddingtonshire. It was expected that she would arrive at East Fortune within an hour or so, and food for the crew sufficient for only a short trip had been taken aboard. Two hours after the start the airship was over East Fortune, but owing to the haze it was deemed expedient that it should remain aloft.

From the North Sea a thick fog developed, and during the night the officers realized that they were completely lost. At last they found themselves twenty miles over the North Sea. Subsequently they reached the aerodrome and cruised overhead all night in the hope of landing in the morning. But the fog prevented this, so eventually they steered south.

In the afternoon, when the fog lifted, the R-34 was able to descend at her destination. The crew, after twenty-one hours in the air, were in a state of exhaustion from the want of food. The most troublesome passengers were three dogs and a cat who were manifestly uncomfortable the whole time.

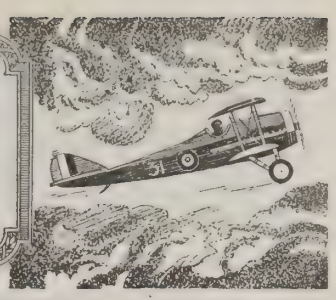


Sectional view of the 200 h.p. Hispano-Suiza motored Sopwith "Dolphin" single seater fighter



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W.
Washington, D. C.
AERO SCIENCE CLUB OF AMERICA
Beach Bldg. E. 23rd St., N. Y. City
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

FOR the benefit of the less experienced model builders and for those who have written to me asking for dimensions of the Lauder Racing Model (which was a former record holder for distance, hand-launched) I am reprinting an article taken from an early issue of AERIAL AGE. Although this model was designed nearly four years ago, it is still in line with the models of to-day and with little practice and careful construction the model flyer can get wonderful results from it.

In order that those interested may obtain an idea of the constructional details that tend to make the model the wonderful flyer it is, we will attempt to give a very complete description of the model. Some time before the National Competitions were held the model made a flight of 195 seconds, this constituting a world's record for duration for this type of model. In the contests the model flew 3,537 feet, which is also a world's record for distance. It will therefore be noted that this model is both a distance and duration flyer, both qualities being seldom found in one model.

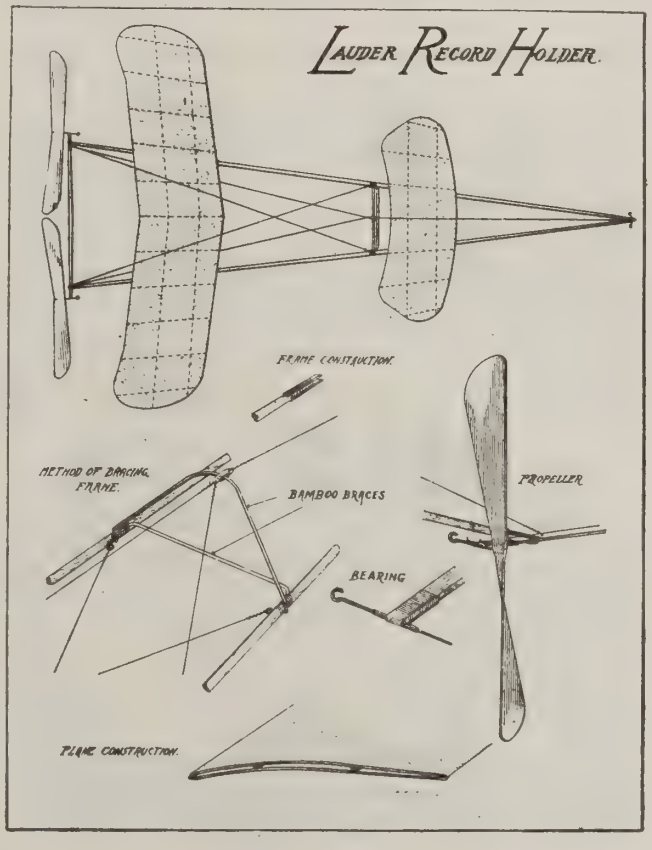
Reference to the accompanying drawings will give a clear idea of the constructional details.

The frame or fuselage consists of two side members 40 inches in length, of straight grained spruce. At the center each member is of approximately circular cross section, and is ¼ of an inch in diameter. The members taper to about 3/16 of an inch at the ends, the circular cross section being maintained throughout. The frame is braced by a strip of bamboo of streamline form, extending from one side member to the other, 18 inches from the apex of the frame. The ends of this brace are bent to run parallel to the side member of the frame, where they are secured by binding with silk thread and gluing. Piano wire hooks are also secured to the side members of the frame adjacent to the ends of the cross brace, and from these hooks extend wires of steel (No. 2 music wire), which run diagonally to the rear brace or propeller bar where they are secured. The frame is braced further by an upwardly arched strip of bamboo, as shown in the dawings, this strip being 2½ inches in height. At the top of this brace are two bronze strips of No. 32 gauge, one above the other, one on top of the brace and the other below. Adjacent to the ends of these strips of metal are perforations, through which pass bracing wires, one of which wires run to the apex of the frame, where a hook is mounted for its reception, and the other two wires extend to the rear of the frame where they are secured to the propeller brace. The propeller brace consists of a strip of streamlined spruce, 11¾ inches in length. The propellers being at an angle, clearance is allowed of ¼ of an inch wide at the center, tapering to 3/16 of an inch at the ends. The ends of the propeller brace extend out 1 inch from the side members of the frame to allow room for the rubber motors. In order to avoid slotting the ends of the side members of the frame so that the propeller brace can be secured therein, thin strips of bamboo are secured above and below the end of each side member—by binding with silk thread and gluing the space between these bamboo strips being utilized for the brace which is securely bound and glued therein. The propeller bearings consist of strips of very thin bronze (No. 32 gauge), about 3/16 of an inch in width, bent over ⅝-inch strips of German silver tubing, the tubing being soldered to the bronze strips and the propeller brace, which fits between the upper and lower portions of the bronze strips is securely bound and glued thereto.

The propellers are cut from solid blocks of pine, and are 12 inches in diameter. The blade, at its widest portion, measures 1⅜ inches. The blades are cut very thin, and in order to save weight, they are not shellaced or painted.

The propeller shafts of piano wire (No. 20 size) to fit the tubing used in the bearings, pass through the propellers and are bent over on the outer side to prevent turning. A few small bronze washers are interposed between the propellers and the outer ends of the tubing to minimize friction when the propellers are revolving. Twelve strands of rubber are used for each propeller, the rubber being ⅛ inch flat.

The planes are both double surfaced, and are of the swept back type. The span of the main plane is 28½ inches, with a chord of 6½ inches. The elevator has a span of 15 inches with a chord of 4¾ inches. The main plane has eleven double ribs, these ribs being built up on main beams of spruce, 1/16 x 3/16 inch, the front beam being placed 1¼ inches from the entering edge, and the second beam being 2 inches back from the front beam. The entering and trailing edges are formed from a single strip of thin split bamboo, all the joints being made by binding with thin silk and gluing. The elevator is constructed in like manner, except that it only has seven ribs, and the measurements are as above set forth. Both planes are covered with goldbeater's air "zephyr" skin, which is first glued in place and then steamed, and given a coat of a preparation used for this purpose.





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

They Took a Chance with Death

They took a death defying chance
Did Hawker and his mate
And with true sportsmen's spirits they
Gave no thought to the fate
That might o'er take them 'ere they reached
The goal they had in view
But trusted to the elements
And God to see them through.

They've set a record even if
The stake for which they played
Is lost for their brave death and the
Great task that they essayed
Has won the admiration of
The whole world and their fame
Will live fore'er, for they were not
Afraid to "play the game."

'Tis by such supermen as these
That daring deeds are done
They blaze a new trail here and there
And new records are won
And in the sporting world to-day
Many will emulate
The daring spirits of such men
As Hawker and his mate.

—*Rose Villar.*



Owing to certain necessary preparations for the trans-Atlantic flight, Dad is going to have some water bill to pay next time
—By Fontaine Fox, in the N. Y. "Globe"

Everybody Can See It

"I don't like flying a bit," said pretty little Mrs. Newlyrich. "I know this aeroplane cost more than a limousine, but we've got to fly so high nobody can see it."

When is a Landing "T" Not a "T"

A humorous incident was brought to light by one of Souther Field Georgia's flyers in relating a trip taken in one of Uncle Sam's airships to a small town in support of the Victory Loan.

The most essential attribute to Aviation is a desirable landing field and an additional asset to a flyer is to know which way the wind is blowing, near the ground, for it is necessary in landing and taking off a ship to do so into the face of the wind.

On an active field strips of white canvas 12 feet long and 1 foot wide are laid out on the ground in the form of the capital letter "T" the top of the "T" facing the wind. The flyer upon seeing this from the air will be assured the direction of the wind.

Before starting on his trip the flyer has informed the Chairman of the Victory Loan Committee over the phone the necessity of a good landing field and also if possible he would appreciate their having a landing "T" on the Field. He was assured this would all be attended to. Upon arriving at the town, there, just on the outskirts, was a well-laid-out landing field; upon getting closer the pilot observed what appeared to be an immense cross standing upright in the center of the field. Someone had taken advantage of a large tree in the center of the field, had stripped it of its branches and then nailed a large board across the top of the tree; the whole thing painted white and this was a landing "T."

The pilot wrote a little note and dropped into the field saying, "I am very sorry but your field is too small to land in."

This enthusiasm and desire of all the southern towns to meet with every requirement of aviation is bound to have its effect, and we can readily predict that such towns as this, even though they make an innocent error the first time, will be eventually rewarded by being one of the regular stops on an aerial mail or passenger route.

—*Wilson.*

Double Crossed

"Ever study symbols?" asked the philosopher at the 'dome. "Funny thing the Huns put a cross on their planes, and that's what most of 'em got. The Allies put rings on theirs, and our flying men made rings round the Huns.

Wear Bathing Togs

Reporter: "You seem uneasy about the Atlantic trip, sir. May I ask the cause?"

Aviator: "It's this difference between the Newfoundland and the London time."

"How does that worry you?"

"I can't work out whether I ought to start in my evening togs or not."

Auroara

Alarmed passengers: "What was that terrible noise, Captain. Has one of the balloons burst?"

As a matter of fact, it was too true. But did that gallant old skipper lose his head? "Ladies and gentlemen," he said, "will you please return to your cabins. Everything is all serene on this airship. What you heard was the day breaking.—*Aircraft.*



Aircraft Advertising Agency, Inc.

280 Madison Avenue

New York

Telephone 1556 Vanderbilt
Cable Address: "Aero-Ads"

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by
"AERO EXPERTS"

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(This Agency will be glad to hear from aviators and companies who have aeroplanes, or balloonists who have balloons, available for advertising purposes in any part of the country, and who are in a position to undertake and carry out business of this kind.)

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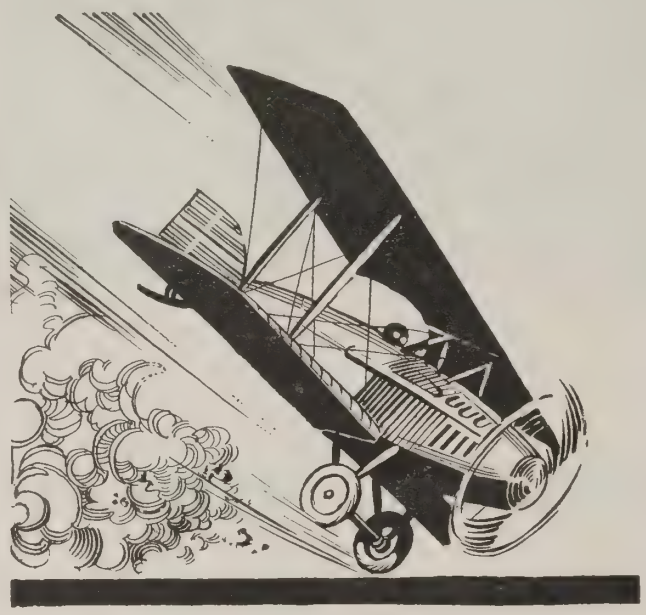
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"Come along and Fly, you don't need to be afraid, for we will insure you."



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Night Landing Apparatus to Indicate Distanch of Aeroplane from Ground

THREE searchlights, which are run by a fan generator attached to the aeroplane, make up the apparatus to indicate the distance of an aeroplane from the ground in night landing. Two searchlights, located under the extreme ends of the lower planes, project their rays perpendicularly to the line of flight, and in such a manner that they cross at a certain distance. A third searchlight located at the end of the fuselage projects its ray so that it crosses the others. Each light is mounted on a joint in such a fashion that it may be moved from side to side.

The regulating consists in giving to the searchlight such an angle that the three rays meet exactly on *O*, a point located slightly in front on the line of flight, so that when descending as the horizontal appearance is lost, the rays meet geometrically in front of the pilot, permitting him to see accurately the beacons which he should always keep in sight.

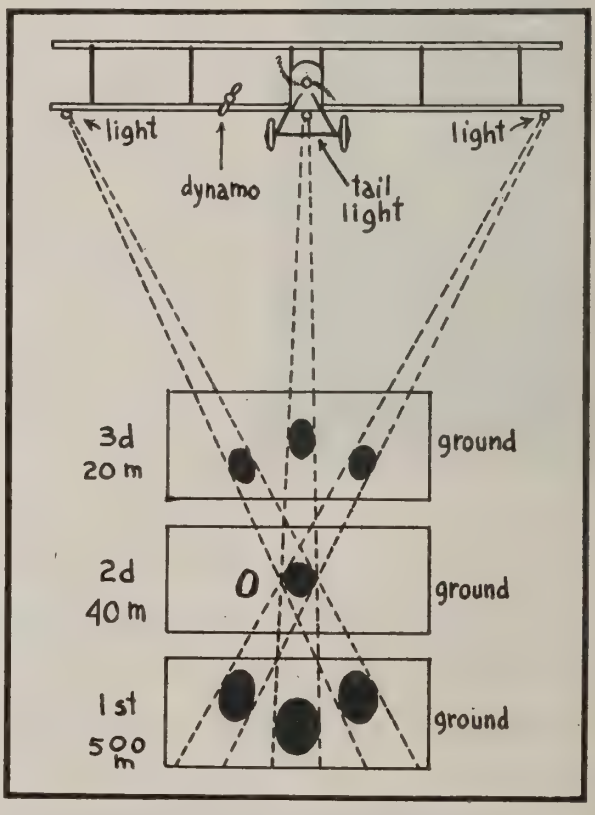


Diagram of the use of night landing lights

Its use is as follows: If, for example, the pilot is at an altitude of 500 meters, he prepares to land, he notes on his altimeter the precise altitude. He knows that from there it will take *T* seconds to get to the ground; and he has only to go through these few operations:

1.—He switches on the dynamo and commences to descend.

2.—He takes care that the ray of the rear searchlight (which at this altitude is ahead) reaches progressively point *O*, which has been calculated in such a manner that it is reached at 40 meters, for example.

Then the pilot knows that it takes *T* seconds to land, a time so short that he should straighten out his machine immediately.

The advantages are: 1—The machine does not require special construction to accommodate this apparatus. 2—It is neither bulky nor expensive. 3—It brings the pilot over point *O* from which he may land in a given number of seconds. 4—It is no bother (only the dynamo need be locked, the movement of the joints and connections trued up). 5—The same apparatus might be employed on seaplanes, as it is exceptionally hard to land them at night.—*Taken from "Eureka" —translated from "Tohtli."*

THE THOMAS-MORSE S-4 C SCOUT

FOR advanced training at nearly all of the Government fields the S-4 C Scout has become popularly familiar. For this stage of training the S-4 C has been used almost exclusively because of its ease of control and manoeuverability made possible by its small size, light weight per horse power and generously proportioned control surfaces.

The usual armament consists of a fixed Marlin or Browning machine gun, firing through the sweep of the propeller; an Adis telescopic sight mounted at the level of the pilot's eyes.

The stick type control is used; ailerons are operated by steel tubes run concealed in the upper plane, aft of the rear wing beam, similar to the French Nieuport Scout.

The S-4 C is suitable for use as a sport machine and for exhibition purposes. A front view of the S-4 C appeared in the March 24 issue of AERIAL AGE.

General Dimensions

Span	26′ 6″
Length	19′ 10″
Height	8′ 1″

Weights

Total weight, loaded	1,330 lbs.
Area, lifting surface (including ailerons)	234 sq. ft.
Loading per sq. ft. lifting surface	5.7 lbs.
Required horse power	90
Weight of machine loaded per horse power	14.8

Power Plant

Engine	Le Rhone (air cooled rotary) 80 H.P.
Engine R.P.M.	1,250
Fuel capacity	30 gal.
Fuel duration at full power	3¾ hours
Oil capacity	6 gal.
Oil duration at full power	4½ hours
Propeller, type	2 bladed
Propeller, diameter	8′ 0″
Propeller, R.P.M.	1,250

Landing Chassis

Type	"Vee"
Wheels	2 (tread 5 ft.)
Tires	26′ × 3″

Aeras of Control Surfaces (*Square Feet*)

Ailerons	25
Elevators	16.8
Rudder	8.5
Horizontal stabilizer	16.8
Vertical stabilizer	3.5

Performances

High speed	97 M.P.H.
Low speed	45 M.P.H.
Cilmb in first 10 minutes	7,500 feet

The Curtiss Model 18-B Biplane

(*Continued from page* 676)

ring surrounding the cockpit, and one which fires through an opening in the under side of the fuselage.

Landing Gear

The track of the landing gear is 59⅛″. Wheels, 26″ in diameter. The axle is located 44¾″ from the nose of the fuselage, and 49½″ below the center line of engine. With the machine in flying position, the center of gravity of machine occurs at a point 16.6″ behind the axle of landing gear.

When at rest on the ground, a straight line from the landing wheels to the tall skid makes an angle of 11° 15 minutes with the center line of thrust.

Tail Group

The triangular fin is 3′ in length and 3′ 6″ in overall height. Rudder, 46″ in overall height and 31 11/16″ in width. The stabilizer is divided at either side of fuselage. Maximum depth at the body, 2′ 5″. Maximum span overall, 10′ 10½″. Elevators are 18⅞″ in width.

Engine Group

The engine is a Curtiss Model K-12. A complete description of it appeared in the February 3, 1919 issue of AERIAL AGE. This engine is a 12-cylinder Vee Type with cylinders cast en bloc. Aluminum is used extensively in its construction.

Rated horsepower at 2500 R.P.M. of the crankshaft, 400. Bore and stroke, 4½″ by 6″.

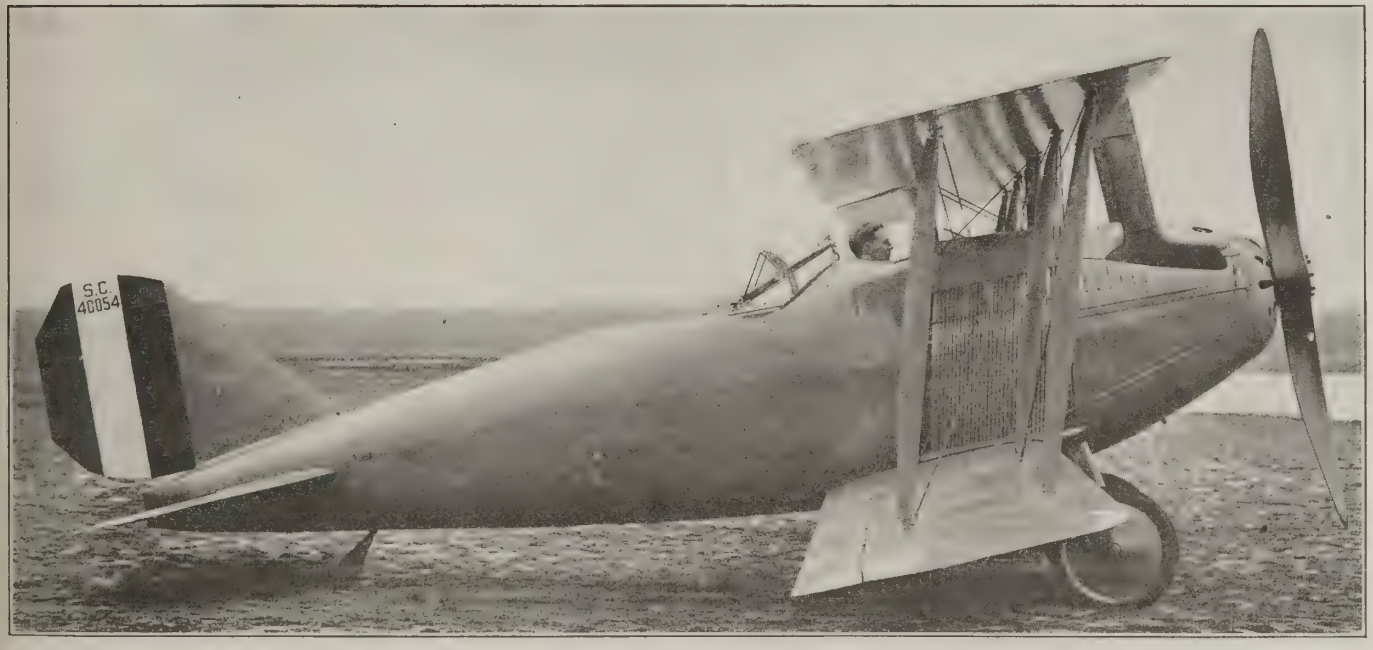
Ignition is supplied by two high tension double spark six cylinder magnetos, located at the front end of engine and driven by beveled gears from vertical shaft through flexible couplings.

Two Duplex type carburetors are used. They are located between groups of cylinders. Carburetors are supplied with an auxiliary altitude hand-controlled air valve and also with non-back-firing screen.

Without oil or water, the Model K-12 weighs 680 pounds. Dead weight per rated horsepower, 1.70 pounds.

Gasolene is consumed at rate of .55 pounds per B.H.P. per hour; oil, .03 pounds per B.H.P. per hour.

The propeller is 9′ 0″ in diameter. In flying position, the tips of the propeller clear the ground by 8½″. When the machine is at rest there is a clearance of 17½″ between the propeller tips and the ground.



The Curtiss Model 18-B biplane with a 400 h.p. Curtiss Model K engine



(*Continued from page* 683)

from which departure was taken and course set for St. John's, N. F. Continued on this course until daylight, when land was sighted on the port bow. This proved to be Great Miquelon Island. Then skirted St. Pierre Island and proceeded up Placentia Bay.

"Radio communication was established with the U. S. S. Chicago and with various other ships and stations. Difficulty was experienced in receiving, due to much interference from the many stations all working on 600-meter wave length. The readings of the radio direction finder were followed for about two hours, when it became evident that certain errors existed. Comparisons of charts and visible land established the position of the C-5 to be in the extreme northern end of Placentia Bay.

Compass Readings Inaccurate

"Course for St. John's was set. This carried the C-5 over a railroad which was identified and followed. Air conditions were so rough that it was next to impossible to follow a compass course. At one point where the railroad forked the C-5 was brought low enough to inquire the proper direction to follow to St. John's.

"Continued along the line of the railroad to Topsail, Newfoundland; when departed from it and made for the sea outside the harbor of St. John's. Then came in over the harbor and landed at Pleasantville at 9:50 a.m., having been in the air for 25 hours and 50 minutes.

The Landing

"The overland trip over Newfoundland was under extremely rough air conditions and with a wind of about 40 miles an hour and stronger in the gusts. The general wind direction was west, though gusts seemed to come from all points of the compass. The landing at Pleasantville was perfect.

"Great credit is due Lieutenant Lawrence and Ensign Campbell, who made it. The ground crew, under command of Lieutenant C. G. Little, U. S. N. R. F., had been thoroughly instructed in their duties and carried out their part of the landing in a most satisfactory manner. Had such not been the case a wreck would probably have resulted at this time.

"After landing the C-5 was turned over to the ground crew, in charge of Lieutenant Little. The C-5 was secured and the work of refueling and gasing started. This was carried on only with great difficulty on account of the rolling and pitching of the C-5. The wind made it impossible to hold her steady.

C-5 Breaks From Moorings

"Every possible effort was made to hold the C-5, but this finally proved to be impossible and she broke adrift from her moorings. No possible precaution had been overlooked. The loss of the C-5 was wholly unavoidable.

"The total duration of the flight was 25 hours and 50 minutes. The distance covered was 1,022 sea miles, This distance takes no account of wide variations from courses caused by very bad air conditions. These variations undoubtedly greatly increased the actual distance covered, but no definite estimate is possible.

"During the flight to St. John's cold was the greatest discomfort, and even that was not really serious. Had the crew not been outfitted with flying suits completely lined with fur the cold would have been severe. As it was the greatest trial was that smoking is not carried on in a dirigible and nearly immediately upon landing every man was puffing away contentedly.

"Before starting from Montauk a supply of milk, chocolate, canned fruit, canned beans and thermos bottles filled with coffee and water had been put on board. Hardly a thing except the chocolate was touched during the flight, and only a part of that, though upon getting on board the Chicago all hands made up for missing meals.

"No hunger and thirst was particularly in evidence at any time while in the air. One member of the crew suffered a short attack of 'seasickness,' but no ill effects resulted. While in the air it was possible to crawl about the car, but as the air grew rougher little of this was done.

"For the most of the time the crew remained in their seats except as reliefs at the wheels changed or it became necessary to carry messages back and forth from the radio cockpit. Space was available in the radio cockpit for a man to curl up on the floor and sleep, but it was too cold and drafty for comfort. Dozing in the seats was far better.

"All told the discomforts were very slight and of no moment as compared with the general interest and experience of the flight."

Special Orders 123-124

(*Continued from page* 695)

The appointments of the following-named officers for the period of the existing emergency are announced:

To be colonels—Lieut. Col. Oscar Westover. Lieut. Col. James A. Mars, Lieut. Col. William F. Pearson.

To be lieutenant colonel—Maj. Horace M. Hickam.

To be first lieutenant—Second Lieut. John J. Redfield.

The following-named officers are relieved from further duty with the Spruce Production Division, Vancouver, Wash.:

Second Lieutenants Charles M. Commins, John A. Dolan, Alfred Gagnon, Isaac Lashua, Frank J. Hellman, William H. Taylor.

The following-named officers will proceed to Camp Pike, Ark.: Capt. Thomas J. Zimmerman, Second Lieut. Will G. White.

Second Lieut. Forrest D. Bradshaw will proceed to Godman Field, Camp Knox, Stithton, Ky.

The following-named officers are detailed for duty with the direction of the Director of Purchase, Storage and Traffic, Hoboken, N. J.: Capt. Clarence E. Osborne, First Lieuts. Daniel Crawford and John McGuire, Second Lieuts. Lloyd J. Peterson, Theodore B. Stutzman, Max W. Henney, John B. Shaver, Carl F. Kennedy.

Second Lieut. Rufus J. Pilcher will proceed to March Field, Riverside, Cal.

Second Lieut. William J. Davidson is detailed for duty with the Medical Department, and will proceed to Camp Lewis, American Lake, Wash., for duty in the base hospital.

Second Lieut. Leo A. Benoit will proceed to United States Naval Air Station, San Diego, Cal.

Par. 88, S. O. No. 119-O, May 21, 1919, relating to Second Lieut. Leland M. Baum, is revoked.

Par. 54, S. O. No. 103-O, W. D., May 2, 1919, relating to Capt. James A. Christie, is revoked.

The leave of absence granted First Lieut. Matthew H. O'Brien by Par. 130, S. O. No. 120-O, W. D., May 22, 1919, is extended five days.

Capt. William Winter will proceed to Hazelhurst Field, Long Island, N. Y.

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AERIAL AGE WEEKLY

Vol. 9, No. 15 JUNE 23, 1919 10 CENTS A COPY



Rollin Kirby in the New York "World"

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VOL. IX NEW YORK, JUNE 23, 1919 NO. 15

THE ATLANTIC BRIDGED IN MAGNIFICENT NON-STOP FLIGHT

IN one straight flight the Atlantic has been crossed. The feat is the greatest sporting event the world has ever known, and from it the names Alcock and Brown will go down in history.

In commenting on the flight Henry Woodhouse, vice-president of the Aerial League of America, declared that the achievement of Captain Alcock and Lieutenant Brown was "the most stupendous feat of the age," and would advance the science of aviation to a degree not to be computed. One of the results that would be sure to follow within two years, he said, was that regular aerial express and passenger planes would be flying between the continents.

"It is the most stupendous achievement of the age," said Mr. Woodhouse. "Few persons, even those in the aeronautical movement, as we call it, believed that a frail thing of sticks and wood, canvass and wire could be capable of such a revolutionary achievement. Most persons, even some who had seen at close hand the remarkable progress of aerial science during the war, believed that the accomplishment of a non-stop flight across the ocean was at least five years off, and this opinion, which was held almost unanimous, adds even more credit to the gallant pilot and navigator of the Vickers-Vimy bombing plane. It is my confident belief that the names of Alcock and Brown, with that of Read and his gallant crew, will go down in history with that of Columbus as leaders of a new race of supermen and the leaders in a new era of communication between the continents.

"It is a stupendous thing to think of men launching themselves into almost limitless space in an aeroplane, which, after all, depends upon the success in flight more upon the confidence and belief of its pilots than upon any other factor. The aeroplane remains aloft and continues its terrific speed only so long as the nerve and endurance of the pilots remain unswerving .

"This flight advances the science of aviation at least five years and, I believe, opens the way to permanent aerial mail, passenger and express service between this country and England and all the other countries in Europe. We may look for swift journeys over the ocean to be almost as numerous as flights over the English Channel are to-day. Alcock and Brown flew across the ocean in a shorter time than it takes the fastest train to run from New York to Chicago, and the actual time of transmission of material objects from this country to Europe is cut more than one-fifth."

Discussing the outstanding features of the flight Mr. Woodhouse pointed out, first, the world will soon find a compensation for the extensive outlay of money and effort made during the war in the development of better and larger and safer aircraft.

Second, there are huge plans to be announced for the employment of aircraft for transportation and other utilitarian purposes, which are expected to go into effect this summer, and the performances which will result will astonish the world. Some of these plans have been under consideration in the United States, others in England, France and Italy, and aim to establish aerial lines throughout the world. The successful flight of Captain Alcock and Lieut. Brown will hasten their realization.

Third, Captain Alcock, Lieut. Brown and Commander Read and the gallant crews of the NC's have opened the trans-Atlantic airways, doing in fifteen hours more than the world's engineers did in years in opening a way from the Atlantic to the Pacific through the Isthmus or by the building of the world's greatest canals, tunnels, or bridges.

Fourth, one of the main factors which made for the success of this flight and which makes this flight conclusive evidence that aerial transportation is possible between the two continents commercially as well as scientifically is the fact that, owing to the great speed of the aeroplane, the flight was completed within the time representing the limit of human endurance. In subsequent flights pilots can probably cut down the time required to fly over the same route to twelve hours, thereby making it possible to use aircraft of the single-crew class for trans-Atlantic air lines.

Fifth, the flight of Captain Alcock and Lieut. Brown and the flight of Commander Read and his gallant crew have opened the way for flights direct from the United States to Europe, but to make these flights without stop it will be necessary to have aeroplanes at least twice as large as the largest aeroplane at present under construction.

Sixth, Ireland is destined to become one of the world's greatest airports, where trans-Atlantic air lines will land to refuel before continuing their journey.

Seventh, too much cannot be said of the reliability of the motors used in this flight, which, combined with the skill and daring of the aviators and the reliable instruments for navigation, opened an entirely new epoch in aeronautics and permit planning the use of aeroplanes for transportation over long distances, where the tremendous speed of aeroplanes can solve difficult problems of transportation.

Comments on the Flight

Alan R. Hawley, president of the Aero Club of America, called it a "magnificent flight!" He said: "We are glad to see that the land planes are able to fly nearly 2,000 miles where it would be impossible to make a landing. This means they can fly to any part of the world almost under any circumstances. No doubt Alcock and Brown will receive the *Daily Mail's* $50,000 prize—and they well deserve it."

Augustus Post, secretary of the Aero Club, said:

"We are delighted at the success of Captain Alcock's flight. We have already seen what the seaplane can do, and this flight of Alcock's shows how tremendous are the possibilities when we can use land planes to cross the ocean. I have no doubt that when the American army land plane starts its flight from the Atlantic to the Pacific it will go through without a hitch."

"It was a wonderful feat," said Secretary Daniels. "I congratulate Mr. Alcock and rejoice with him. His flight is indicative of the great things that are ahead in aviation."

Rear-Admiral David W. Taylor, chief naval constructor, who is conceded to have been the "father" of the American plan to cross the sea in an airship, also expressed his admiration of the pluck of the two British aviators.

"I am heartily glad they made it," he declared. "It means that long-distance flying will become immediately more popu-

lar and we can expect other record-making trips."

"I am pleased to hear of the successful negotiation of the second stage of the progress in trans-Atlantic flight," said Glenn H. Curtiss, pioneer aviator and builder of the NC-4, the first heavier-than-air craft to cross the Atlantic. "The crossing with our seaplane with one stop in midocean was the first stage. This flight without stop is the second. The third will be the crossing with a useful load abroad. With the culmination of that event commercial aviation as applied to overseas flight shall have been accomplished.

"Naturally, I prefer the seaplane for the trans-Atlantic flight to the plane designed primarily for land flights. In the first place, there is always the difficulty of taking off from the land, as has been very clearly demonstrated by all of the flights which have been attempted in Newfoundland. According to reports from St. John's the Vickers had a hard time leaving the ground with the heavy load it carried. The Martinsyde crashed when it struck a small bump in the earth.

"The flight of our three NC planes showed, much to the surprise of many persons, that machines of that type are able to stand a great deal of punishment from rough seas. With some improvements suggested to us by experience they will be capable of riding out reasonably rough weather.

Third Stage Within a Year

"Aviation is developing faster than could with reason be hoped. Within another year we shall have accomplished the trans-Atlantic flight with a useful load, thus reaching the third stage of overseas aeroplane development.

"I shall cable my congratulations to Captain Alcock and Lieut. Brown."

"One great stunt," was the comment of Lieut. Commander Albert C. Read of the American seaplane NC-4, the first to cross the Atlantic, on the successful flight of Captain Alcock and Lieut. Brown.

"While there is nothing which will add much information to the art of aviation as a result of the flight," he continued, "it was a wonderfully nervy thing to attempt and a magnificent achievement. I have much admiration and respect for the men who attempted the great feat in face of such odds. It required a machine built of the best material, but, above all, staunch determination and unflinching courage. They also made the attempt at the right time."

Commander John H. Towers of the NC-3 said:

"It was a splendid feat."

GREATER NAVAL AVIATION APPROPRIATION URGED

URGING that Congress appropriate $45,000,000 for naval aviation during the next fiscal year and declaring that $36,000,000 is the very lowest figure that should be appropriated, if the American Navy is not to fall behind, Secretary Daniels sent to Senator Carroll S. Page, Chairman of the Naval Committee, a letter urging an increase in the $15,000,000 appropriation granted by the House.

Secretary Daniels informed Senator Page that if the appropriation should remain at $15,000,000 this country could only "mark time" in aviation, when it should be leading.

Great Britain and France are going ahead with plans for aviation development on a large scale. Great Britain has made available for the current year an appropriation of $320,000,000 for army and navy aircraft development, and France $200,000,000. The American Government is behind in lighter-than-air development. It has no rigid dirigibles. The British Government is going in strongly for the development of large rigids. The rigid dirigible R-34, which is soon to leave England for a round trip trans-Atlantic flight, is part of the British development.

Secretary Daniels' letter follows:

"My Dear Senator:

"The Naval Bill as reported to the House has cut the appropriation for Navy Aviation to $15,000,000. I deem it my duty to bring to your attention the fact that with this amount Navy Aviation will practically 'mark time' during the next year, which should be a year of rapid development, and will be a year of rapid development of this arm of the Navy in countries other than the United States. This is sufficiently indicated by the fact that in Great Britain the appropriation for aviation made for the current year amounts in round figures to $320,000,000. This includes all aviation for military purposes, and should, of course, be compared with the total contemplated appropriations for both Army and Navy in the United States, amounting to something like $30,000,000.

"The General Board of the Navy, after extended hearings covering the whole field of aviation, recommended a program for the next fiscal year which our experts estimated would require the $45,000,000 originally asked for by me in Congress. I feel very strongly that the figure of $36,000,000 reported by the Senate Naval Committee during the last session should at least be provided if we are to make any approach to the aviation activities and development considered necessary by the General Board.

"It will be recalled that in 1909 the feat of Bleriot in flying across the English Channel in a plane propelled by a motor of about 25 H.P. was regarded as miraculous. In ten years the development of heavier-than-air craft has been so remarkable and progressive that recently we have seen our multiple-engined NC-4 successfully completing a voyage from New York to Plymouth by way of Newfoundland, the Azores and Portugal. We are now expecting a visit from the British Rigid R-34, which is to make the attempt to fly directly from England to the United States. The performances of this British Rigid to date indicate the practicability of a voyage, and even should the present attempt fail by some mischance, there is every prospect that the voyage will soon be successfully accomplished.

"These long voyages have demonstrated beyond doubt the practicability of the large lighter-than-air ship. There can be no doubt in the mind of any one that aviation is destined to assume a role of tremendous importance in the affairs of the world. At present the largest field for aircraft is the military one, and by the rapid development of such aircraft only is it practicable to reach a condition of commercial application.

"I feel sure you will agree with me that the United States, where was built and operated the first successful flying machine, which under the stress of war has made supreme effort during the past two years and is now, broadly speaking, abreast the rest of the world in aeronautical development, and ahead in some respects as instanced by the successful voyage of the NC-4 should not now falter and fall by the wayside in aviation.

"I regret to inform you that an appropriation of $15,000,000 will not suffice to permit the construction of large rigids in this country, and possibly it will not even allow the beginning of a 'rigid' program. There is not on this continent at this time a dirigible hangar large enough to house the English R-34, and the visit of that vessel to our shores must be curtailed because of the possibility of the ship being wrecked in the event of occurrence of bad weather.

"The rigid dirigible has been of splendid service during the war. Both Germany and Great Britain used them successfully. Admiral Jellicoe stated that a rigid dirigible was worth two light cruisers, and it is of interest to note the statement of the British Admiralty to the effect that at the battle of Jutland the German fleet, though inferior in numbers, was able to escape complete destruction because of the good use of its scouting airships. It may be of interest to you to know that inquiries are now being made on the part of the British Government as to the possibility of a hangar for rigids being allowed in this country for use by a foreign-owned Zeppelin employed commercially.

"I will not dwell on the part played during the war by aircraft in patrolling our own coast and the coasts of our Allies, but I wish to invite your attention particularly to the importance of aircraft operations with the fleet.

"Spotting from aircraft increases the gunnery efficiency at long ranges tremendously, and gunnery efficiency perhaps is, more than anything else, the real measure of efficiency of the fleet. Several times in our recent fleet exercises low visibility or smoke screens absolutely prohibited spotting from ships, and all spots had to be taken from the spotters in the aircraft overhead. The improvement in the ability to spot is one of the compelling reasons for shooting at longer ranges. A naval action undoubtedly will be begun in clear weather at ranges of over 20,000 yards and spotting from high in the air will be of paramount importance.

"In the British fleet planes are now carried on all battleships as well as in special vessels intended to convey them. Aviation is recognized as a definite and permanent part of the fleet.

"As regards the large flying-boat type, we are in a reasonably satisfactory position, but the type must be further developed and will be during the year if money is available. As regards aeroplanes for regular use of the fleet, a recent development, and one which, as indicated, is essential for fleet efficiency, we should take the matter up vigorously at once, install the best type of such craft now available, and keep the installation up to date as the art develops. As regards lighter-than-air craft, we are ready to build on a reasonable scale on practically equal terms with the rest of the world. The type is sufficiently developed to warrant building in reasonable numbers, and in the judgment of the military experts of the Department, the prompt development of the lighter-than-air craft is of the utmost importance.

"Sincerely yours

"Josephus Daniels."



The News of the Week



Aerial Commuters From Down-town New York Taken to Country Homes in Flying Boats

New York, N. Y.—Inaugurating a commuters' aerial service, Mr. Edmund Randolph, broker, and Mr. R. W. Allen were taken to their homes by Curtiss hydro-aeroplanes at Locust Valley and at Great Neck Bay, L. I., respectively, from off the Battery. Mr. Allen was piloted to his home by his son, Captain A. Livingston Allen, in less than thirty minutes. The time of travel was thus cut to less than half and the comfort and convenience of travel greatly increased. It is predicted that this means of travel will be utilized by several business men whose offices are in downtown New York within a few weeks.

Boston to New York in One Hour

Lieutenant Colonel Leonard H. Drennan, Air Service officer of the Northeastern Department, made a record flight between Boston and New York in a De Haviland Four, flying from Boston to Hazelhurst Field, L. I., a distance of 175 miles in 83 minutes, thus averaging over two miles a minute. Lieutenant Willis R. Taylor accompanied him as a passenger.

Utica Newspaper Delivered by Aeroplane

Utica, N. Y.—The Utica *Daily Press* is arranging with the Mohawk Valley Aeroplane Corporation for the delivery of its special aeroplane edition to Old Forge and the surrounding districts.

Navy Plans Include Around-the-World Flight

Washington, D. C.—In discussing plans for the reception of the British dirigible R-34, which is expected to reach this country within ten days, an official high in naval aviation circles declared that the Navy's plans for developing lighter- than-air travel had not stopped short of the possibility of a round-the-world flight in a dirigible.

In discussing the Naval aeronautic program, Secretary Daniels intimated that a trans-Pacific flying boat trip has been contemplated.

Aerial Express Service Between Allentown and New York in Operation

Arrangements have been completed between Philip W. Blake, executive secretary of the Allentown (Pa.) Chamber of Commerce and Lieutenant Morse D. Levitt of the American and Canadian Allied Flying Circus, Inc., of 1482 Broadway, N. Y., for the operation of a regular aerial express to make aeroplane deliveries of merchandise from the New York market for the merchants of Allentown. This will probably be the first aerial express service in operation on a co-operative basis.

The consignments of goods are shipped from the Central Park, L. I., field of the flying circus and consist of assorted merchandise. The aeroplane lands at the Allentown Country Club, on the outskirts of the town. Lieutenant Franklin F. Snyder, who has spent two years in the air service, was the pilot on the first trip.

Alliance Single Motored Plane Entered in Trans-Atlantic Contest

The latest entry for the trans-Atlantic flight is the "Sea Bird" of the Alliance Aeroplane Co., a company controlled by Waring and Gillow. It has been built from the design of Mr. J. A. Peters, who will pilot the machine across the Atlantic and is a single-seater biplane with a 450 h.p. "Lion" Napier engine. The machine is illustrated on this page, which shows the comfortable accommodation provided for both pilot and navigator. The machine is fitted with wireless, having a transmitting range of 250 miles, and a receiving range of 2,500 miles, and a directional installation by means of which the navigator will be able to be in direct communication with the compass stations both in Newfoundland and Ireland at any time during its flight, and can accordingly set his course independently of other means. The main particulars of the "Sea Bird" are as follows: Span, 53 ft.; length, 33 ft. 6 ins.; area, 700 sq. ft.; total weight, 7,400 lbs.; petrol, 500 gals.; oil, 50 gals.; range, 3,000 miles; max. speed, 140 m.p.h.; landing speed, 45 m.p.h.; engine, 450 h.p. Napier.

Aerial Landing Field Established at Oklahoma City

Oklahoma City.—A forty-acre landing field, known as Westwood Field, has been in operation for several months. It is located in a suburban section of the city, convenient to rail and street car transportation.



© Underwood and Underwood

The English officers who arrived on the Adriatic to prepare for the arrival of the dirigible R-34. From left to right (front row): W. H. Thompson, J. H. Guile, Leonard Sparks, Ivor England. (Back row): Martin Rampton, Ernest Turner, Lieut. Col. Lucas, in command, Major Fuller, Albert Poole and William Angus



Hangar erected by Alfred Decker & Cohn, for two Curtiss JN-4D-2 aeroplanes, used in a regularly-scheduled delivery service

Chicago Clothing Distribution by Aeroplane Follows Regular Routes

Chicago, Ill.—The aerial delivery service for Alfred Decker & Cohn, Chicago clothing merchants, was inaugurated on June 3. A 40-acre field at Maywood is the headquarters of the express system and two Curtiss JN-4D-2 aeroplanes piloted by Lieut. David L. Behncke form the original equipment.

The first week's schedule included trips to the leading colleges and universities in the Middle West. Routes have been laid out between Chicago and Madison, Wis.; Chicago and Galesburg; Chicago and Champaign, Ill.; Chicago and South Bend, Ind., and Chicago and Lafayette, Ind.

The Chicago-Madison route includes stops at Beloit College and the University of Wisconsin; the Chicago to Galesburg route takes in Knox College; the Chicago to Champaign route takes in the University of Illinois; the Chicago to Lafayette route takes in Purdue University, and the Chicago and South Bend route takes in Valparaiso University and the University of Notre Dame.

Leaving Chicago at 12 o'clock, the aeroplanes reach Kankakee, Ill., forty-five minutes later. They leave Kankakee at 2:30 and an hour later deliveries are made in Champaign.

Lincoln Aero Club, of Nebraska, Affiliates With Aero Club America

The Lincoln Aero Club of Nebraska, with its headquarters at Lincoln, was accepted into affiliation by the Aero Club of America at a meeting held June 4.

It held its first banquet on April 2, at which over two hundred people were present, and the prospects are for the working up of a very enthusiastic aeronautic contingent in Lincoln.

The appointed officers of the Lincoln Aero Club of Nebraska are as follows: President, Raymond R. Farquhar; First Vice-President, Phil L. Hall, Jr.; Second Vice-President, Leo Fahlman; Secretary, Abe D. Zook; Treasurer, S. J. Dunn; Chief Engineer, H. B. Wild.

The insignia of the Lincoln Aero Club of Nebraska is most appropriate, being that of a winged head of Abraham Lincoln.

It has followed by-laws of the Aero Club of America as its constitution and has six classes of membership, i. e., honorary, collegiate, life, army and navy, resident and non-resident.

Articles of incorporation of the Lincoln Aero Club of Nebraska were filed in the office of the Secretary of State, State of Nebraska, on the first day of April, A. D. 1919.

American Medical Association Convention Discusses Medical Aspects of Aviation

Atlantic City, N. J.—Physicians outlined plans to aid fliers at a meeting held on June 13. The first society in the United States to lay down what are said to be scientific and accurate tests to determine the abilities of an airman organized and elected officers. The organization is the outgrowth of the American Medical Association convention.

This body will help the Government in taking and maintaining the air supremacy of the world, according to Colonel John O. McReynolds, Dallas Tex., who was elected president of the newly formed Air Service Medical Association.

It is planned to popularize flying, and it is expected thousands will become aviators, he said. Tests will be made to determine the special work for which each is fitted, the height to which he may safely ascend, and details of a similar nature.

The first aeroplane ambulance seen in Atlantic City arrived here on June 13 from Mineola, L. I., after a flight of 118 miles in 80 minutes. It bore a medical man coming here to attend the convention of the American Medical Association, the first to arrive by this route.

The plane is used in army hospital work, and the trip was made to demonstrate the value of the army medical equipment under special permission of the government. Lieutenant W. F. Sharon was the pilot and Flight Surgeon L. R. Burnett traveled as a passenger.

A sick or wounded soldier can be carried in a compartment in the rear of the plane in absolute comfort with room for the surgeon to attend him. The patient lies on a Stokes litter, a single wire held in by specially arranged webbing belts. He is placed on the bed through an aperture in the lower part of the fuselage of the plane.

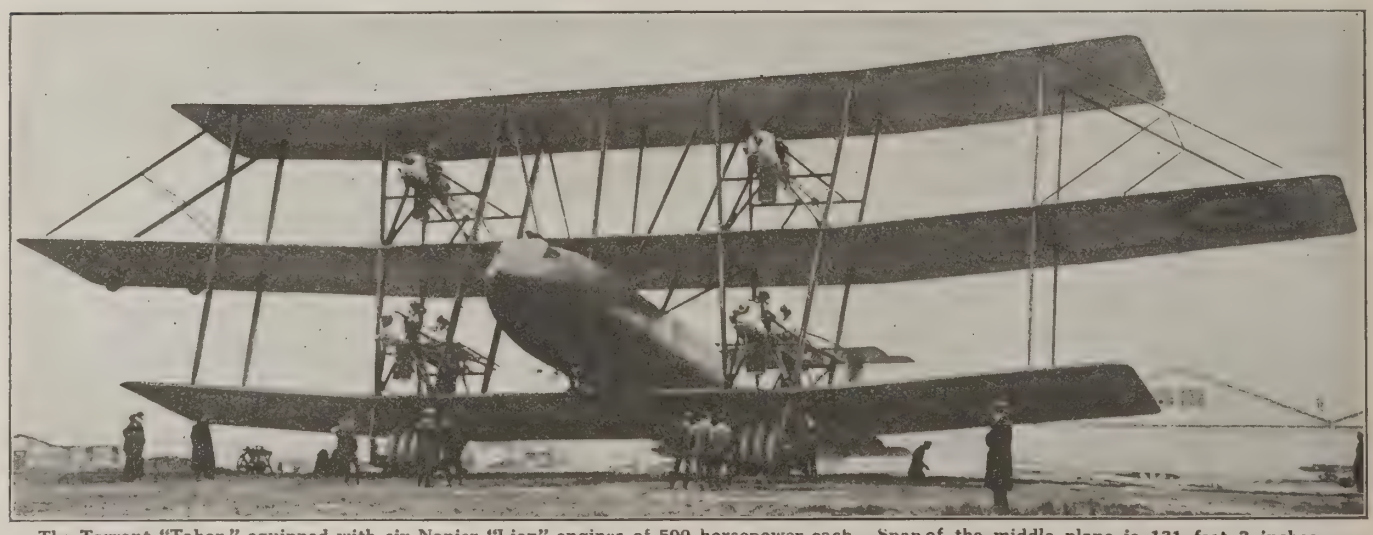
De Hart and Budwig Carrying Passengers from New York City Field

New York, N. Y.—Dana C. De Hart and Gilbert C. Budwig have started a passenger-carrying service from their flying field at Hillside Drive and North Westland, Queens, N. Y. Both the aviators were employed as civilian instructors throughout the war, and since that time have been in the aerial mail service. Curtiss biplanes are used, which are inspected before each flight. All passengers are insured to the extent of $1,000.

Aerial Map of Fort Sill-Oklahoma City Route Being Made

Oklahoma City.—An Army photographic squadron is making a huge photographic mosaic of the route between Fort Sill and Oklahoma City, covering a strip eighty miles long and twenty miles wide. Thirty thousand plates will be exposed and when completed the map will be 76 feet long and 16 feet wide.

The squadron has established its headquarters at Westwood Field, and is in charge of Lieut. L. M. La Plant, and consists of four pilots, three observers and six enlisted men.



The Tarrant "Tabor," equipped with six Napier "Lion" engines of 500 horsepower each. Span of the middle plane is 131 feet 3 inches. Overall height is 37 feet 3 inches. Overall length, 73 feet 2 inches. Total weight, 45,000 pounds

VICKERS-VIMY BIPLANE MAKES FIRST NON-STOP TRANS-ATLANTIC FLIGHT

BY successfully flying across the Atlantic from St. John's, Newfoundland, to Clifden, Ireland, Capt. John Alcock and Lieut. Arthur W. Brown, pilot and navigator of the Rolls-Royce motored Vickers-Vimy biplane, are the winners of the *Daily Mail* $50,000 prize. The flight of approximately 1,960 miles was completed in 16 hours and 12 minutes, averaging nearly 120 miles an hour.

The report of Alcock and Brown to the Aero Club was as follows:

"Landed at Clifden at 8.40 A.M., Greenwich mean time, 15th of June, Vickers-Vimy Atlantic machine leaving Newfoundland coast at 4.28 P. M., Greenwich mean time 14th of June. Total time, 16 hours 12 minutes.

ALCOCK & BROWN."

But the brief and modest description which comes from the airmen at Clifden tells of an adventurous and amazingly hazardous enterprise. Fog and mists hung over the North Atlantic and the Vickers-Vimy biplane climbed and dived, struggling to extricate herself from the folds of the aeroplane's worst enemies. On one occasion she rose to 11,000 feet and swooped down almost to the surface of the sea, and at times the two voyagers found themselves flying upside down.

Before coming to earth near the Clifden wireless station Alcock circled the wireless aerials, seeking the best spot to reach the earth, but no suitable ground was found, so he chanced it in a bog.

The wireless staff rushed to the aid of the aviators. They found Brown dazed and Alcock temporarily deafened by the force of the impact.

Captain Alcock's first interview on the flight as published in the *Daily Mail,* is as follows:

"We have had a terrible journey. The wonder is that we are here at all. We scarcely saw the sun or the moon or the stars. For hours we saw none of them.

"The fog was very dense and at times we had to descend to within 300 feet of the sea. For four hours the machine was covered in a sheet of ice, caused by frozen sleet. At another time the fog was so dense that my speed indicator did not work, and for a few seconds it was very alarming.

"We looped the loop, I do believe, and did a very steep spiral. We did some very comic stunts, for I had no sense of the horizon.

"Winds were favorable all the way, northwest, and at times southwest. We said in Newfoundland we would do the trip in sixteen hours, but we never thought we should. An hour and a half before we saw land we had no certain idea where we were, but we believed we were at Galway or thereabouts.

"Our delight in seeing Eastal Island and Turbot Island, five miles west of Clifden, was great. People did not know who we were when we landed and thought we were scouts on the lookout for the Vimy.

"We encountered no unforeseen conditions. We did not suffer from cold or exhaustion, except when looking over the side. Then the sleet chewed bits out of our faces. We drank coffee and ale and ate sandwiches and chocolate.

"The flight has shown that the Atlantic flight is practicable. It should be done not with an aeroplane or a seaplane but with a flying boat.

"We had plenty of reserve fuel, using only two-thirds of our supply. The only thing that upset me was to see the machine at the end get damaged. From above, the bog looked like a lovely field, but the machine sank into it up to the axle and fell over on to her nose."

Mists robbed the night of the advantage of the full moon and the propeller of the generator for wireless apparatus was torn away by the wind soon after the start. So the two aviators were thrown upon their own resources. The skilful navigation which brought the machine near to the center of the Irish coastline was one of the finest features of the flight. Before starting on the flight Lieut. Brown had stated that an effort would be made to land at Clifden, and his success in attaining his objective despite the handicap due to impossibility of making observations from the stars or to use the radio equipment, is a remarkable feat of navigation.

The unbroken silence of the Vickers radio had caused apprehension, not only among the ships far flung across the Atlantic which had been listening for word from the pioneer, but also among thousands on both sides of the ocean who had waited expectantly for some flash of news from the speeding 'plane.

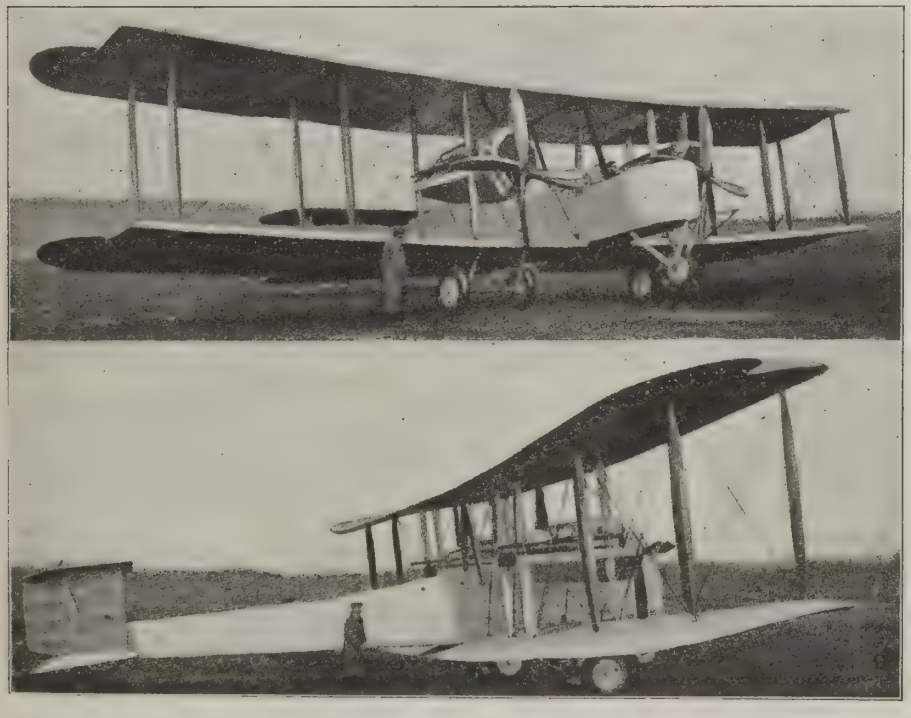
Harry G. Hawker is credited by the

(*Continued on page* 746)



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Captain James Alcock, D. S. C. (at right) and Lieutenant Arthur Whitten Brown, who made the first non-stop trans-Atlantic flight in a Vickers-Vimy biplane



Two views of the Vickers-Vimy biplane, powered by two Rolls-Royce motors, which made the first successful non-stop trans-Atlantic flight with an average speed of 120 miles per hour

THE GENERAL PROPERTIES AND USES OF PLYWOOD

By B. C. BOULTON, B. S., A. E.

FOR a material combining lightness and strength, wood would be unexcelled if it were of homogeneous structure. In tensile strength parallel to the grain, certain heavy woods like pignut hickory are more than half as strong as mild steel, and their weight is less than one-eighth that of steel. Spruce, a typical light wood, has a fifth the strength of steel, yet only an eighteenth its weight. The same is true, though to a less degree, of the modulus of rupture, and the compressive strength of wood parallel to the grain. However, the tensile and crushing strength perpendicular to the grain, and the modulus of elasticity in this direction, are but a tenth to a twentieth of these values. On the other hand, the resistance of wood to shear parallel to the grain is many times less than its resistance to shear across the grain. Because of these facts, the utilization of the full tensile strength of wood, or of its high modulus of rupture, is made difficult. This is due to the trouble in holding a member by bolts or similar means, to the large bearing surface necessary to prevent crushing of the wood perpendicular to the grain, or to weakness in horizontol shear.

The chief function of plywood is to equalize the strengths of wood in directions at right angles to each other. This is accomplished by cutting the wood into thin sheets, called veneer, which are then glued together to form a laminated structure, composed of a central core, or cross-band, on both sides of which are glued sheets of veneer with their grain at right angles to that of the core. These are the outside or face plies in three-ply panels. In multi-ply construction the procedure is the same, except that extra plies are added, an equal number on each side of the core, and every ply is placed with its grain at right angles to that of the layer immediately beneath it.

Another very important result obtained by plywood construction is the practical elimination of warping. In ordinary wood, changes in its moisture content produce shrinkage, which is much greater, proportionally, in a direction transverse to the grain than parallel to it. When this shrinkage is unequal on the two faces of a board, owing to more rapid alteration in moisture content on one side, warping occurs. By making the shrinkage in one direction oppose that in the other, properly constructed plywood prevents the difficulties caused by shrinkage. In the more extended discussion that follows is explained the manner in which plywood modifies the properties of natural wood.

Woods Used in Plywood Construction: On account of the many new uses to which plywood has been put during the war the varieties of woods employed in its manufacture have changed considerably. Extensive testing has brought about the elimination of some species, because of their lack of suitability for structural purposes, and has caused the selection of several of the little used woods for special work.

The species from which most plywood was made before the war are given below, in the approximate order of their importance: Gum, maple, oak, poplar, ash, basswood, birch, elm, walnut, beech, yellow pine, cottonwood, sycamore, and mahogany. Several woods, notably spruce, Spanish cedar, and redwood, which formerly were seldom used, have been found to be among the best for meeting the requirements of aeroplane construction. The more important properties for structural plywood are lightness combined with high bending and compressive strength, stiffness, and toughness or resistance to splitting. Other qualities which are desirable, but which do not vary greatly in different species, are resistance to distortion, due to variation in moisture content, and ability to take glue well.

Some aeroplane parts call for a very strong, tough wood, and one of the heavier species, like birch or maple, must be employed; while other parts require the qualities of lightness and stiffness together with moderate strength, such as is found in varying degrees in spruce, poplar, basswood, and Spanish cedar.

Factors in the Design of Plywood

Symmetrical Construction: The first principle governing the construction of plywood is that of symmetry. On either side of the center layer or core there must be an equal number of plies. The number of laminations in plywood must therefore be always odd. For each ply on one side of the core there must be a corresponding ply in the same relative position on the opposite side of the core. Both such plies must be of the same thickness and same species of wood, preferably, cut in the same manner, that is, by a rotary cutter, slicer, or veneer saw. Furthermore, the grain of two layers, which are both the same distance from the core, must run in the same direction. The reasons for this manner of construction are in the main connected with the phenomena of shrinkage.

On account of the great difference, with any wood, between the shrinkage parallel to the grain and that perpendicular to it, stresses will always be set up or released in plywood when its moisture content is altered. Considering a three-ply panel, for example, if the humidity increases the core will tend to expand transversely, but since it is rigidly glued to the face plies, in which the grain is at right angles to that of the core, this transverse swelling is checked, on account of the fact that the face plies do not deform appreciably in a direction parallel to their grain. They are therefore put in tension. In a similar way the face plies would expand in a direction perpendicular to their grain were they not restrained by the core, thereby being put under compression. Each one of the three plies is thus subjected to tensile stresses parallel to its grain, and to compressive stresses transverse to its grain.

The application of the principle of symmetry will prevent warping, for it is evident that if the face plies, or with multiply wood all pairs of corresponding, intermediate plies as well, are of the same thickness density and species, and have their grain running in the same direction, the stresses on either side of the core will be balanced. However, should similarly situated plies be of unequal thickness or character, or not have their grain parallel, either cupping or twisting of the panel will occur. Because of these facts, it is clear that in sanding plywood care must be exercised to sand both faces equally.

An extreme example of distortion results when one of the faces of a thin, three-ply panel has its grain perpendicular to that of the other face ply. If such a panel is dried, it will curl up almost into a cylinder with the ply, whose grain is parallel to the grain of the core, on the inside. This phenomenon is produced by the unsymmetrical distribution of the shrinking stresses. Placing the grain of each face ply at an angle of 45° to that of the core and of 90° to that of the other face ply, will cause another extreme case. A change in moisture would bring about a twisting or curling up of such a panel in the direction of one of its diagonals.

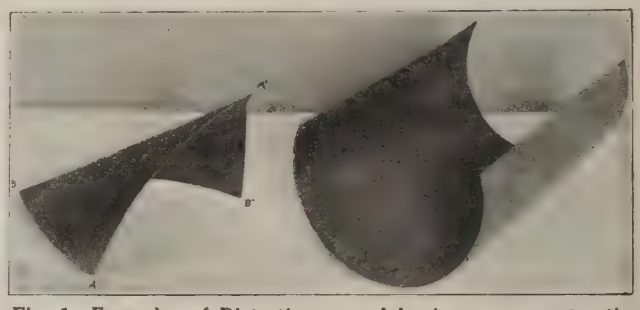


Fig. 1—Examples of Distortion caused by improper construction

Fig. 1 shows both types of deformation, and Fig. 2 the manner in which the amount of distortion is measured.

This discussion makes evident the necessity for having the grain of adjacent plies as exactly at right angles as is practical. Furthermore, to reduce shrinkage stresses to a minimum, it is desirable that the moisture content of the plywood, when the latter is removed from the clamps after gluing, be as closely as possible the same as it will be in actual service.

Owing to the fact that the shrinkage of different varieties of wood, with the same alteration in moisture content, is never identical, the amount of shrinkage in a panel will vary with the species or combination of species used. It is also dependent on the relative thickness of the different plies and the number of plies. A series of 54 shrinkage tests were made recently by the Forest Products Laboratory on combinations of ten of the more common species of wood. The average shrinkage in bringing the panel from the soaked to the oven-dry condition was .45 per cent parallel to the grain and .67 per cent perpendicular to it. Individual results ranged from .2 to 1.0 per cent, and from .3 to 1.2 per cent, respectively. These values should be contrasted with shrinkage, under the same conditions, of 8.5 per cent for flat-sawn boards and 4.5 per cent for quarter-sawn lumber, which are average values for 150 species.

Number of Plies: Several factors must be considered in determining the number of plies it is best to use. The most important effect of increasing the number of plies is to make the plywood more homogeneous. Its strength in both bending and tension in the direction of the grain of the face plies is decreased, while its strength in a perpendicular direction is raised, until the strengths in each direction are nearly equal. Hence, the three-ply type is best if much greater strength is desired in one direction than in another. Approximate equalization of the strengths of a three-ply panel in each direction can also be accomplished by properly proportioning the core thickness. However, in resistance to splitting action, such as is needed when plywood is fastened by screws near its edges, the three-ply can never be made to equal the multi-ply construction.

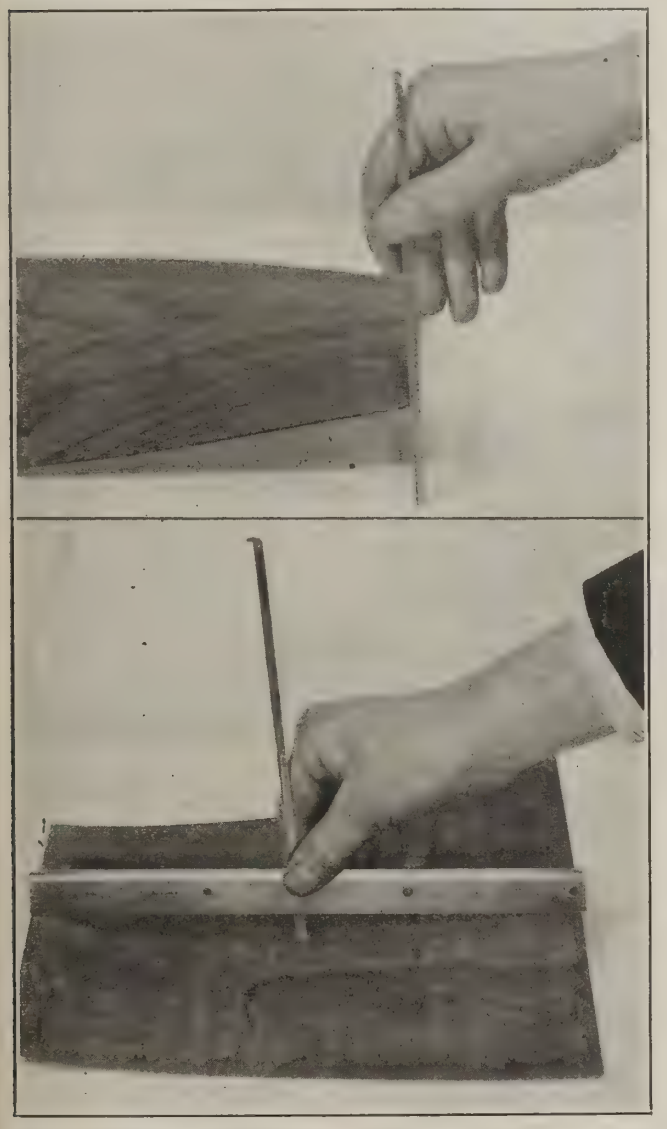


Fig. 2—Methods of measuring the cupping and twisting of plywood

In general, whenever a joint is made between two thick laminations which have their grain at right angles, there exists a tendency to weakness along the joint. This is also the case with plywood made up of heavy veneer, and is due at least in part to the greater shrinkage stresses that occur with thick plies. The use of fairly thin plies renders less likely the development of weakness along a joint.

Another consideration that is sometimes the controlling factor in deciding on the number of laminations, is that the extra glue required where many thin plies are used adds very appreciably to the weight. This point should always be considered. In case it is especially desirable that the plywood remain very flat, multi-ply construction is advisable. The reason that distortion is practically eliminated is that the shrinkage stresses are more nearly equalized.

Lastly, certain commercial reasons may affect the number of plies. Of these factors, the principal one is the extra labor entailed in the multi-ply type of panel. In certain instances, particularly where the total thickness of the plywood is small, the maximum number of plies is limited by the minimum thickness to which it is practicable to cut veneer. This varies with the hardness of the wood, the closeness and nature of its grain, and the method employed in cutting the veneer. For rotary cutting 1/48 in. is a usual minimum, and for slicing 1/64 in. Because of the difficulties in handling very thin veneer, the widths of such sheets are usually limited. Species of low density and open structure cannot as a rule be cut less than about 1/32 in. thick.

Ratio of Core to Total Thickness: As suggested before, the strengths of plywood in directions parallel and transverse to the grain of the face plies may to a large extent be modified by the ratio of the core to total thickness. The term core is here meant to include all the layers whose grain runs perpendicular to that of the faces. The purpose for which the plywood is intended largely determines this ratio of core to total thickness. For example, to obtain the same tensile strength in each direction, the core should be .5 the plywood thickness, while for equal strengths in bending this proportion should be .7. However, the presence of shrinkage stresses may introduce an uncertainty that upsets any calculations. A large proportion of core laminations is effective in reducing any tendency to distortion.

Low Density Species for Cores: The strength of a panel subjected to tensile stresses parallel to the grain of the faces is independent of the nature of the core. On the other hand, the modulus of rupture and the column strength may be very largely affected, owing to the fact that these properties are proportional to the moment of inertia of the cross-section of the panel. Of two cores, equal in weight but differing in density, the low density core will be the thicker, and hence will space the outer plies further apart. Experiments have shown that plywood in carrying an axial load acts like a long column whose capacity is a function of its slenderness ratio. From this it is apparent that any increase in the spacing of the face plies, secured by using a thick, low density core of basswood or poplar, will add appreciably to the column strength parallel to the grain of these plies. It should be carefully noted, however, that this increase in strength is due solely to the greater distance between the effective plies, and not to the character of the wood in the core.

In general, for large column strength the face plies should be thin, and of a strong wood like birch or maple, and be separated as far as possible. This same disposition of material will add to the resistance of the plywood to cupping and twisting.

In this connection the Forest Product Laboratory found from its tests that panels constructed of low density woods were less inclined to distort than those built up of species of high density. This slightly greater tendency to warp must be balanced against the better structural characteristics of a panel with strong face plies. It might also be added that tests have indicated no difference in the tendency to warp of wood cut by a slicer or rotary cutter, but sawn veneer will usually warp the least.

Total Thickness of Panel: Several thousands of tests on plywood of eight thicknesses, varying from 3/30 in. to ½ in. total, and including all the common species, give data on the effect of panel thickness upon the various physical properties of plywood. All the specimens in the tests were of rotary cut veneer, and each panel was three-ply, with all the plies of the same thickness. It was shown that the panel thickness has no effect on the unit, tensile strength. That portion of the material in which the grain was perpendicular to the direction of stress for the most part influenced the strength very slightly. The unit tensile strength parallel to the grain was 1½ to 2 times as great as that transverse to the grain.

Tests on the column bending modulus ($P/A + My/I$), a property analogous to the ordinary modulus of rupture for bending, brought out somewhat different results. When the load was applied perpendicular to the grain of the face plies this property was constant for all thicknesses. But with the load applied parallel to the grain of the face plies, a considerable uniform increase in the modulus occurred as the panel thickness was increased from 1/10 in. to ½ in. For all the common varieties of wood the total increment amounted to from 29 to 31 per cent of the value of the modulus when the thickness was 1/10 in. The ratio of the column bending modulus with the load applied parallel to the grain, to that when the load was perpendicular to the grain, varied from 4 to 5. The difference between the unit column loading (i. e., the direct compressive stress, P/A) in these two directions was even more marked. For this case the ratio between the column loads, parallel and perpendicular to the grain of the face plies, supported by two panels of the same length and sectional area, varied between 10 and 14, according to the species of wood. The variation, with the panel thickness, in the total load car-

ried was found to follow the law for slender columns and was proportional to the cube of the panel thickness, and the square of the column length.

Those tests made on panels constructed of two species of wood in combination demonstrated that the properties of plywood panels in the direction in which the load is applied are dependent entirely upon the character of the plies whose grain is parallel to this direction. For instance, irrespective of whether the core is of high or low density, provided its thickness is the same, the column bending modulus, the unit column loading, and the tensile strength of a panel are high if the face plies are of a strong, tough wood. And if the panel has a low density core and is subjected to a load transverse to the grain of the face plies the properties will all be as low as if the face plies were of no stronger wood than the core.

Resistance to splitting, as determined by the total work per inch thickness necessary to cause failure, increases to a certain extent as the panel thickness becomes greater. This property is of importance if screws or nails near the edge of plywood must be relied upon to hold it securely.

The cupping and twisting of a panel, of a thickness greater than ¼ in., is small and nearly constant. But with decreasing thickness the distortion grows large and variable.

Glued Joints and Splices

The Forest Products Laboratory has also conducted a number of tests on three-ply panels made up of 1/16 in. basswood and sugar maple veneer, to determine the most efficient types of splices and joints. Two series of tests were made. In the first series two kinds of joints were employed, the diagonal butt and the simple scarf. Some of the panels had a diagonal butt joint in both faces, and some in the core only. For this first series the scarf joints were all in the core. In the second series of experiments splices were made in one face ply only. They were of three types: the simple scarf, the diagonal scarf, and the saw-tooth butt joints. All tests were made in column bending, as shown in Fig. 3, the results being expressed in terms of the column-bending modulus. All the panels in the first series were 5 x 12 in.; those in the second set, 5 x 20 in. The panels were all tested with their long dimension parallel to the direction of the load.

Effect of Slope: The experiments on all-maple panels with a diagonal butt joint in each face indicated that the strength of such a joint increases progressively with its slope. For example, when the slope was 4 to 5 the efficiency of the joint was 20 per cent. This was brought up to 57 per cent. when the slope was 12 to 5. In the case of the all-basswood panels, the corresponding efficiencies for slopes of 4 to 5 and 12 to 5 were 41 per cent. and 100 per cent., respectively. In these two sets of tests the load was applied parallel to the grain of the face plies.

With the maple panels in which a diagonal butt joint was used in the core the efficiency, with a slope of 4 to 5, was 86 per cent., and it increased to 100 per cent. with a slope of 8 to 5. In the case of basswood panels, however, 100 per cent. efficiency was obtained with the minimum slope of 4 to 5.

A simple scarf joint in the core having a length of .7 in., which gives a slope of 1 to 11, had an efficiency of 85 per cent. for both maple and basswood panels. Had the length of the scarf been 1¼ or 1½ in. the joint would very probably have been 100 per cent. efficient. In all of these tests made on core splices the load was applied parallel to the grain of the core ply.

For the second series of tests the simple scarf joints were ¾, 1¼ and 2 in. long, corresponding to slopes of 1 to 12, 1 to 20, and 1 to 30. All the panels in this series had basswood cores. The ¾ in. simple scarf joint with maple faces was 59 per cent. efficient, the 1¼ in. point 93 per cent., and the 2 in. joint 100 per cent. The corresponding joints with basswood faces were 40, 100 and 100 per cent. efficient. When a diagonal scarf joint 1 in. long was used, the efficiency increased somewhat as the slope of the joint became greater, but in neither the maple nor the basswood panels did the diagonal scarf show any improvement over the simple scarf. Not until the slope was 12 to 5 did this joint give 100 per cent. efficiency.

The general results of tests on saw-tooth butt joints were the same for both maple and basswood panels. A joint in which the ratio of width of tooth at the base to length of tooth was 5 to 5 proved to be about 40 per cent. efficient, and as the ratio was decreased to 5 to 13 the efficiency rose to 80 per cent. In every test made on this type of joint failure

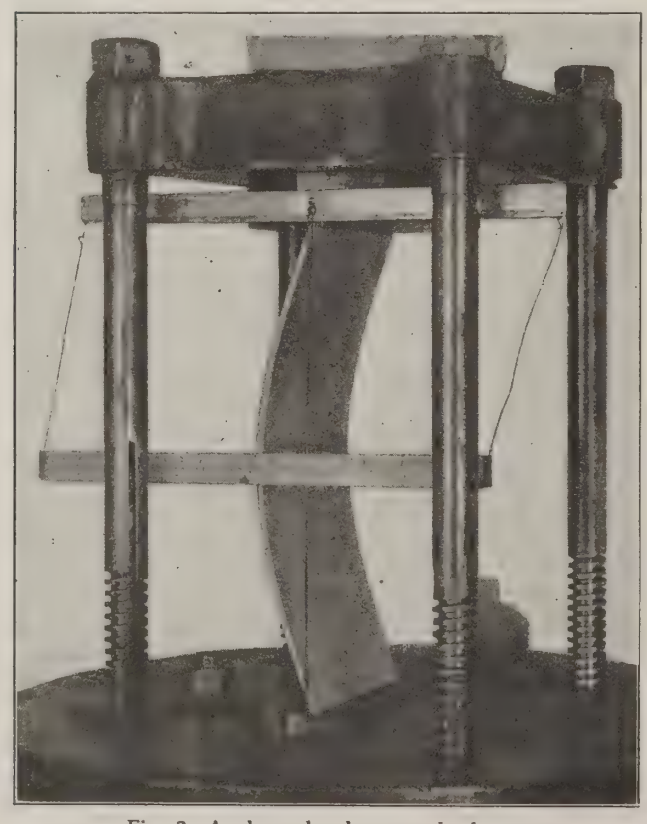


Fig. 3—A plywood column ready for test

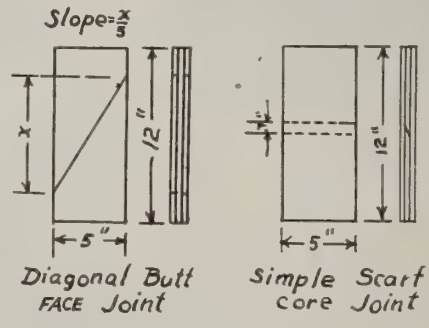


FIGURE 4

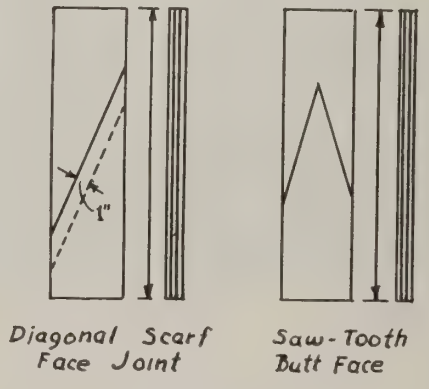


FIGURE 5

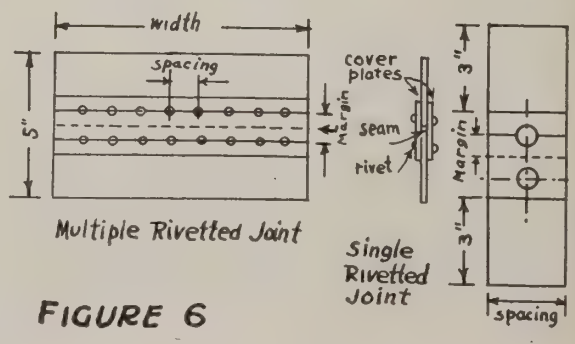


FIGURE 6

occurred in the glue. With both the saw-tooth and diagonal butt joints there was always a strong tendency for the point to separate from the core that was particularly noticeable in panels having maple faces.

In summarizing this discussion, it may be said that the saw-tooth joint is the least satisfactory of any of the types investigated, while the diagonal butt joint is not as good for most purposes as the simple scarf joint. The latter is superior to the diagonal scarf and can be made 100 per cent. efficient. The most effective length for a simple scarf joint in a 3/16 in. panel is 1½ in., which corresponds to a slope of 1 to 25. Figs. 4 and 5 illustrate the various kinds of joints tested.

Riveted Joints

Before it had been demonstrated that glued joints were much more satisfactory, except in special cases, than riveted, plywood joints extensive tests had been conducted on this type. But a brief discussion will be given of the results of this work. When the spacing of the rivets and the width of the margin are most efficient, the particular size of rivet used has no appreciable effect on the strength of the joint. Since, however, small rivets give their best values for a close spacing, a larger number of them is necessary. This causes much extra work when the smaller sizes are used. On the other hand, the largest rivets require only a third the number of holes and yet make as strong a joint. They are therefore generally to be recommended.

As a material for rivets, aluminum has the advantage over copper or steel due to its lightness, malleability, and the fact that it gives a tight fit when slightly upset. The tubular form of rivet is superior to the solid unless the size is very small.

The spacing of ⅝ in. rivets should be about 1¼ in. center to center, and the margin, or distance between the joint and the center line of the row of rivets, should be not less than 1½ in. A margin of 1¾ or 2 in. is recommended if the grain of the faces is perpendicular to the seam. For .15 in. copper rivets the best results were secured with ½ in. spacing and 1 in. margin. Fig. 6 illustrates the single and multiple-rivet types of joints tested.

All of these tests were made on joints with either a single rivet or a single row of rivets. For this reason no conclusions can be drawn or recommendations made relative to joints in which two or three rows of rivets are used. The kind of joint investigated was the butt type with two veneer cover plates. Veneer cover plates are probably best, though where the joint is exposed, the air resistance can be reduced by the use of sheet aluminum and by countersinking the holes so that the rivets will not protrude. The finished joint may be covered with cloth, glued on and varnished. When the grain of the outer plies is perpendicular to the seam the efficiency of the best riveted joints is about 30 per cent.; when the grain is parallel to the seam this value rises to about 50 per cent.

(To be continud.)

Functions and Organization of National Advisory Committee for Aeronautics

Washington, D. C.—At a meeting of the Executive Committee of the National Advisory Committee for Aeronautics, held on May 20, the following plan of organization was approved:

The Executive Committee shall have six sub-committees, to be known as standing committees on

(a) Aerodynamics,
(b) Power Plants for Aircraft,
(c) Materials for Aircraft,
(d) Personnel, Buildings, and Equipment,
(e) Publication and Intelligence,
(f) Governmental Relations.

These standing committees may, from time to time, appoint special sub-committees with the approval of the Executive Committee.

The functions and membership of the standing committees shall be as follows:

AERODYNAMICS:

Functions.—The functions and duties of this committee shall be:

1. To aid in determining the problems relating to the theoretical and experimental study of aerodynamics to be experimentally attacked by governmental and private agencies;

2. To endeavor to coordinate, by counsel and suggestion, the research and experimental work involved in the investigation of such problems;

3. To act as a medium for the interchange or information regarding aerodynamic investigations in progress or proposed;

4. The committee may direct and conduct research and experiment in aerodynamics in such laboratory or laboratories, either in whole or in part, as may be placed under its direction;

5. The committee shall meet from time to time on call of the Chairman, and report its actions and recommendations to the Executive Committee.

Organization.—Chairman, Dr. John F. Hayford; Vice-Chairman, Dr. Joseph S. Ames; Professor Charles F. Marvin; Colonel T. H. Bane, U. S. A.; Lieut. Col. V. E. Clark, U. S. A.; Dr. A. F. Bahm; Lieut. Commander J. C. Hunsaker, U. S. N.; Dr. L. J. Briggs; Mr. M. D. Hersey; Mr. E. P. Warner, Secretary.

POWER PLANTS FOR AIRCRAFT:

Functions.—The functions and duties of this committee shall be:

1. To aid in determining the problems relating to power plants for aircraft to be experimentally attacked by governmental and private agencies;

2. To endeavor to coordinate, by counsel and suggestion, the research and experimental work involved in the investigation of such problems;

3. To act as a medium for the interchange of information regarding aeronautic power plant investigations, in progress or proposed;

4. The committee may direct and conduct research and experiment on aeronautic power plant problems in such laboratory or laboratories, either in whole or in part, as may be placed under its direction;

5. The committee shall meet from time to time on call of the Chairman, and report its actions and recommendations to the Executive Committee.

Organization.—Dr. S. W. Stratton, Chairman; Mr. L. M. Griffith; Professor George W. Lewis; Major George E. A. Hallett, U. S. A.; Mr. J. G. Vincent; Mr. Harvey N. Davis; Dr. H. C. Dickinson, Acting Secretary; one member to be nominated by the Navy Department.

MATERIALS FOR AIRCRAFT:

Functions.—The functions and duties of this committee shall be:

1. To aid in determining the problems relating to materials for aircraft to be experimentally attacked by governmental and private agencies;

2. To endeavor to coordinate, by counsel and suggestion, the research and experimental work involved in the investigation of such problems;

3. To act as a medium for the interchange of information regarding investigations of materials for aircraft, in progress or proposed;

4. The committee may direct and conduct research and experiment on materials for aircraft in such laboratory or laboratories, either in whole or in part, as may be placed under its direction;

5. The committee shall meet from time to time on call of the Chairman, and report its actions and recommendations to the Executive Committee.

Organization.—Dr. S. W. Stratton, Chairman; Dr. G. K. Burgess, Vice-Chairman; Lieut. Col. H. C. K. Muhlenberg, U. S. A.; Lieut. Commander J. C. Hunsaker, U. S. N.; Mr. H. L. Whittemore, Acting Secretary.

PERSONNEL, BUILDINGS, AND EQUIPMENT:

Functions.—The functions and duties of this committee shall be:

1. To handle all matters relating to personnel, including the employment, promotion, discharge, and duties of all employees and others assigned to the committee for duty;

2. To consider questions referred to it and initiate projects concerning the erection or alteration of buildings and the equipment of buildings, offices, etc.;

3. To meet from time to time on call of the Chairman, and report its action and recommendations to the Executive Committee;

4. To supervise such construction and equipment work as may be authorized by the Executive Committee.

Organization.—Dr. Joseph S. Ames, Chairman; Dr. S. W. Stratton, Vice Chairman; Professor Charles F. Marvin; Mr. J. F. Victory, Secretary.

PUBLICATIONS AND INTELLIGENCE:

Functions.—The functions and duties of this committee shall be:

1. The collection, classification, and diffusion of useful knowledge on the subject of aeronautics, including the results of research and experimental work done in all parts of the world;

2. The encouragement of the study of the subject of aeronautics in institutions of learning;

3. Supervision of the Office of Aeronautical Intelligence;

4. Supervision of the foreign office in Paris;

5. The collection and preparation for publication of the annual report and its appendices.

Organization.—Dr. Joseph S. Ames, Chairman; Professor Charles F. Marvin, Vice-Chairman; Miss M. M. Muller, Secretary.

GOVERNMENTAL RELATIONS:

Functions.—The functions and duties of this committee shall be:

1. Relations of the committee with Executive Departments and other branches of the Government;

2. Governmental relations with civil agencies.

Organization.—Dr. Charles D. Walcott, Chairman; Dr. S. W. Stratton; Mr. J. F. Victory, Secretary.

Due to the reduced activities of the Air Service it has been necessary to report all class 3 officers who have been approved for the examinations. These are being surplused to the Air Service and available for assignment to other activities, but it is hoped that further Air Service legislation may permit the return of these men to duty with the Air Service.

THE GRAHAME-WHITE SPORTING AEROPLANE

THE feature which impresses one most on first seeing this Grahame-White model, to which the name of the "Bantam" has been given, is its extremely small size. The span of the G.W. "Bantam" is only 20 ft. and its overall length 16 ft. 6 ins., so that it may be housed in a very small shed. The smallness of the machine will, perhaps, be more evident from an examination of one of the accompanying illustrations than it would be possible to convey by any quotation of figures.

The G.W. "Bantam" is not a racing machine, the wing section having been designed with a view to fairly high lift rather than for high speed. In spite of this fact, however, the maximum speed is quite good—about 102 m.p.h. at low altitudes and 93 m.p.h. at 10,000 ft. As the engine fitted is of 80 h.p. (le Rhone), this is not a bad performance, especially as the climb appears to be very good. The landing speed is about 40 m.p.h.

As regards her handling in the air, she appears capable of practically all the evolutions performed by the higher-powered machines, although her lower power naturally does not allow of such steep climbs or prolonged "Zooms" as may be tackled with immunity in single-seaters designed for military purposes and fitted with engines of three or four times her power. The machine is very sensitive on the controls, both laterally and longitudinally. This is, presumably, due to her small moments of inertia around all three axes, and to the general compactness of the machine.



The 80 h.p. Grahame-White "Bantam"

The general specifications of the Grahame-White "Bantam" are as follows:

General Dimensions

Span, upper plane	20′
Span, lower plane	18′ 4″
Chord, upper plane	4′ 6″
Chord, lower plane	3′
Overall length	16′ 6″

Areas

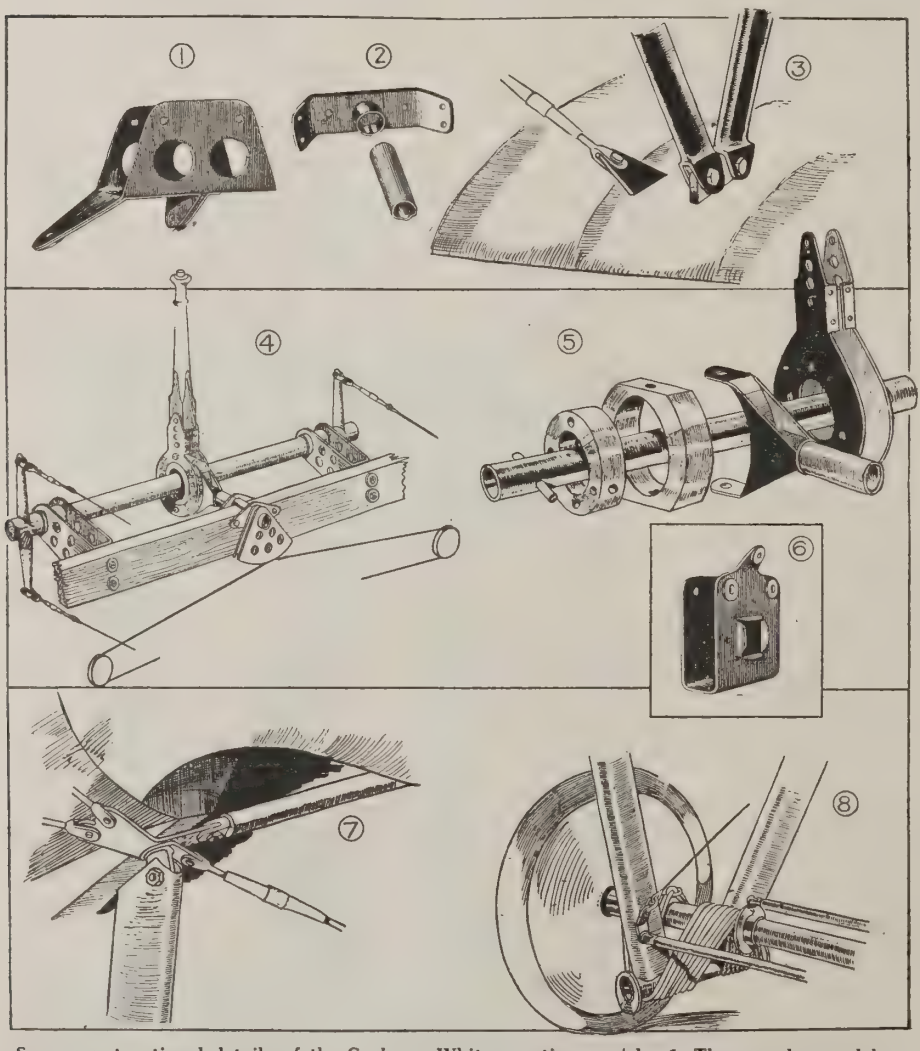
	Sq. ft.
Upper main plane	83
Lower main plane	47
Ailerons, each	8
Stabilizer	19
Elevators	10
Fin	3.75
Rudder	5.5

Weights

	Pounds.
Empty	640
Fully loaded	995
Weight per horsepower	12.45
Load per square foot	7.51
Disposable load (apart from fuel)	200

Performances

Speed at low altitude	102 M.P.H.
Speed at 10,000 feet	93 M.P.H.
Landing Speed	40 M.P.H.
Tank capacity, hours	2.3



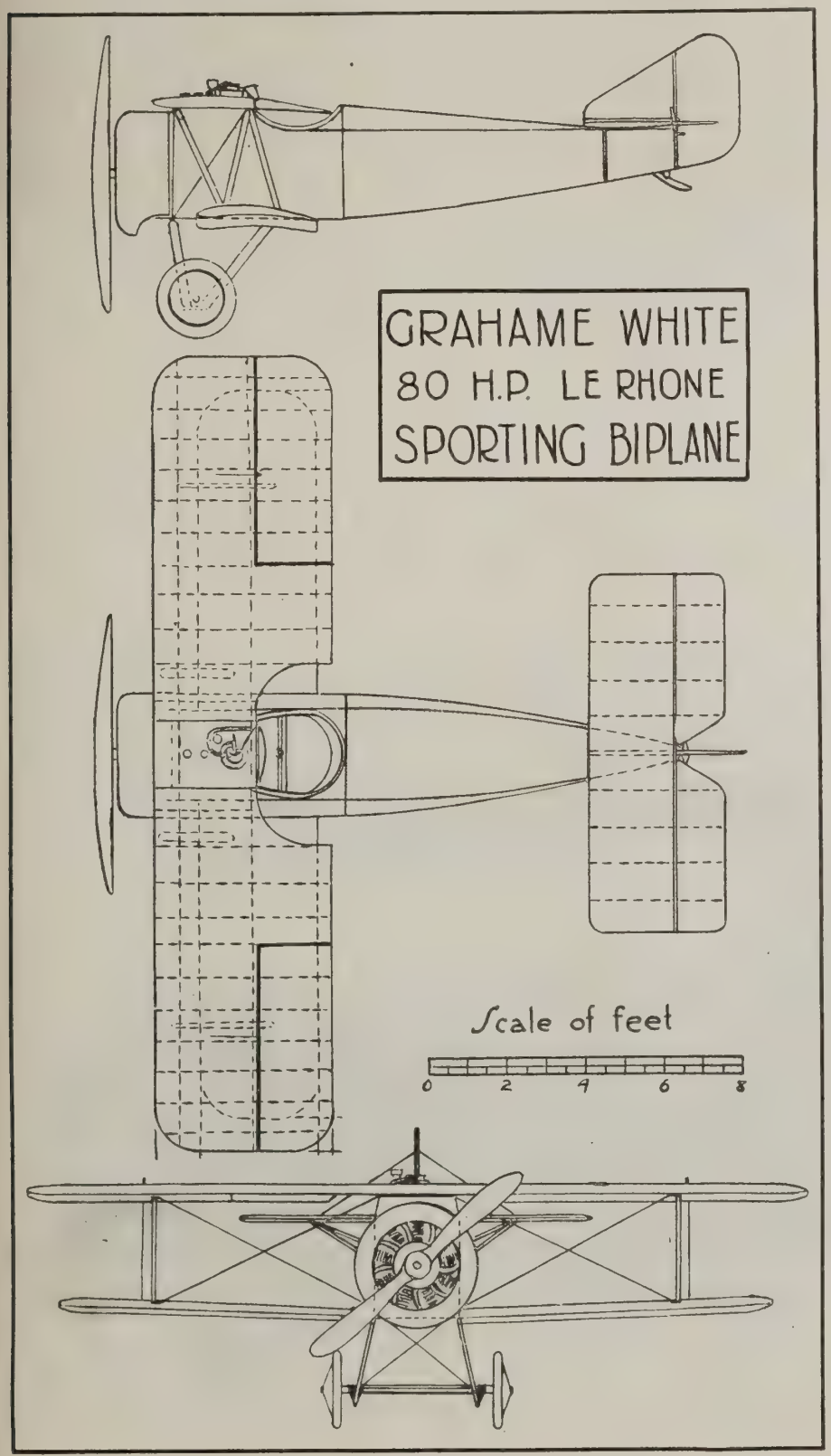
Some constructional details of the Grahame-White sporting model.—1. The spar box and lug for attachment of interplane strut. 2. The wiring plate and socket for tubular compression strut of internal bracing. 2 is secured to 1 by two horizontal bolts. Fig. 3 is an external view of the attachment to the bottom front spar of the interplane struts. The controls are shown in Fig. 4, details of which are indicated in Fig. 5. Fig. 6 shows the fuselage clip. Details of the undercarriage are shown in Figs. 7 and 8.

Constructionally the G.W. sporting model shows many detail features that are of interest, some of which we have illustrated in the accompanying sketches. The object which the designer, M. E. Boudot, has kept in mind in getting out the details is simplicity and ease of manufacture. The construction of the wings follows more or less standard practice as regards the details. The spars, which are of I-section spruce, rest in mild steel boxes to which are attached the lugs for the interplane struts, and also the wiring plates and sockets for the compression tubes of the internal bracing system. In the accompanying set of sketches Fig. 1 shows one of the top plane front strut attachments. The spar box has riveted and brazed to it the lug for the interplane strut, and is extended inwards to form the wiring plate for the front lift cable. Two vertical bolts secure the box to the spar, while the wiring plate for the internal drift bracing is attached to the spar

and to the box by two horizontal bolts. (Fig. 2.) A somewhat unusual feature of the top plane is the position of the rear spar, which is a good deal farther forward than is the custom. This is done in order to make it clear the pilot where it crosses the fuselage.

The top plane runs straight across from tip to tip without any dihedral, and is attached to the top of the fuselage by a very strong box-like structure, covered in with the rear of the body and containing the main fuel tank. The rear face of this box serves as a support for the instrument board. The fuel service tank is enclosed in the center of the top plane.

The bottom plane is built in two halves, each attached to the ends of two short lengths of spars permanently fitted under the bottom of the fuselage. The front spar attachment is situated between the front and rear chassis struts, while the rear spar attachment coincides with and is part of the rear chassis strut fitting. The bottom plane spar fittings are of the same type as those of the top plane. Fig. 3 shows the bottom front spar fitting in external view. In principle it is the same as that shown in Fig 1, but the lug has accommodation for two interplane struts, the struts being arranged in this machine in the form of a letter N. The struts are elliptical section steel tubes. This same N formation is also found in the lift bracing, which consists of plain stranded cable. In addition to the usual two lift cables there is a third one running from the top of the rear interplane strut to the attachment of the bottom front spar to the fuselage. The obliquity of this third cable assists in relieving the internal drift bracing of some of its load. The landing cables run from the bases of the interplane struts to a single point at the top rear spar where this meets the top of the fuselage.



The fuselage is of the usual girder type, with longerons of rectangular section solid ash. The struts are vertical in the rear portion of the body, and the bracing here is of solid wire. In the front part, that is from the pilot's seat forward, the body struts are arranged as a series of triangles without any wire bracing. The bottom of the fuselage is flat, but the top is surmounted by a turtle back, and the sides are slightly rounded off aft and more markedly so in front, where they finally merge into the circular shape of the cowl. The sides are rounded off with longitudinal stringers, which are attached direct to the vertical body struts in the rear portion, while in front, where the curvature is more pronounced, they are secured to light three-ply formers. The covering of the body is fabric in the rear half and three-ply wood in front.

The controls are of a very neat type, and are illustrated in some of the accompanying sketches. The details of the universal joint of the control stick are somewhat unusual and form the subject of a sketch. On the dash in front of the pilot are mounted a very complete set of instruments, conveniently arranged. The engine plate is one of the lightest we have yet seen, weighing as it does only 12 lbs. It consists of the usual capping plate over the nose of the fuselage, made of 14 gauge steel and further lightened by circular holes, flanged to give greater rigidity. The rear engine-bearer is formed by a pyramid of channel section members bolted to the main engine plate and carrying at their other end—at the apex of the pyramid—the rear engine support. The engine—an 80 h.p. le Rhone—is overhung and is surrounded by an aluminum cowl. At present no "spinner" is fitted, but later it is intended to fit one over the hub of the airscrew. The latter has, we understand, been designed acording to data furnished by M. L. de Bazillac, who has devised a method which affords, by the simple use of a series of charts, the simultaneous solution of both aerodynamical and static propeller problems at a glance without any involved calculations, all such data as diameter, pitch angle, blade sections, intake velocity, etc., being read off directly on the charts. As the machine is so small, it has been desirable to fit a propeller of very small diameter so as to keep down the height of the undercarriage, and this fact formed a severe test of M. de Bazillac's method. However, the efficiency appears to be good in spite of the small diameter allowed, and the method appears to have been proved very satisfactory. Certainly for quickness it has much to recommend it.

The undercarriage is a simple Vee type, with struts of stream-line section steel tubes. The manner of attaching these struts to the body is shown in one of the accompanying sketches. A very stout eyebolt passes through the bottom longerons

(*Continued on page 733*)

THE NAPIER "LION" 450 H. P. AERO ENGINE

AS will be seen from the illustrations the Lion aeromotor consists in the mass of three groups or "banks" of four cylinders each, mounted "broad-arrow" fashion at that angle to one another which, in the four-stroke cycle, has been found the most appropriate for ignition with but two magnetos, in the requisite range of advance and retard. In type it is just on the short-stroke side, the bore being 5½ ins., and the stroke 5⅛ ins.; the normal speed in r.p.m. being such as to sustain best the approved normal propeller speed, as effected by the reduction gearing, with a visible acceleration, so it is understood, above that normal, for the higher altitudes.

In the original serial issue, each group of four cylinders was water-jacketed, monoflux fashion, although each cylinder was formed then as now, as a unit machined from the solid steel forging. But now each cylinder is separately water-jacketed as well, the thin steel water-jackets being formed of sheet metal pressings, united in vertical welded seams back and front, and welded to cylinder flanges at the top and bottom of the water-spaces in a slightly downward tapering formation, the reason for which will be presently apparent. This construction not only eliminates gaskets and leak-rings, but also the adaptors and tapered wedge nuts for the sparking plug bosses of the former monoflux pattern; these bosses being now not only screwed into the cylinders, but welded in place. It will be noticed that on the induction side, and on either side of the boss-insertions—in each group—horizontal water-connections or spouts are welded into the top of the jackets, in flats pressed therein; and united with rubber hose-tubings and clips, so as to maintain a direct line water-inlet runway. On the exhaust side, at the bottom of the jackets, similar water-unions are likewise formed and united for a direct water outlet runway. But their lessened diameter being additional to the jacket taper, the object of keeping the cylinders warm and thus retaining greater thermal efficiency at all altitudes, is finally attained; this being one of the details of design obviously helpful towards the low consumption of the Lion motor.

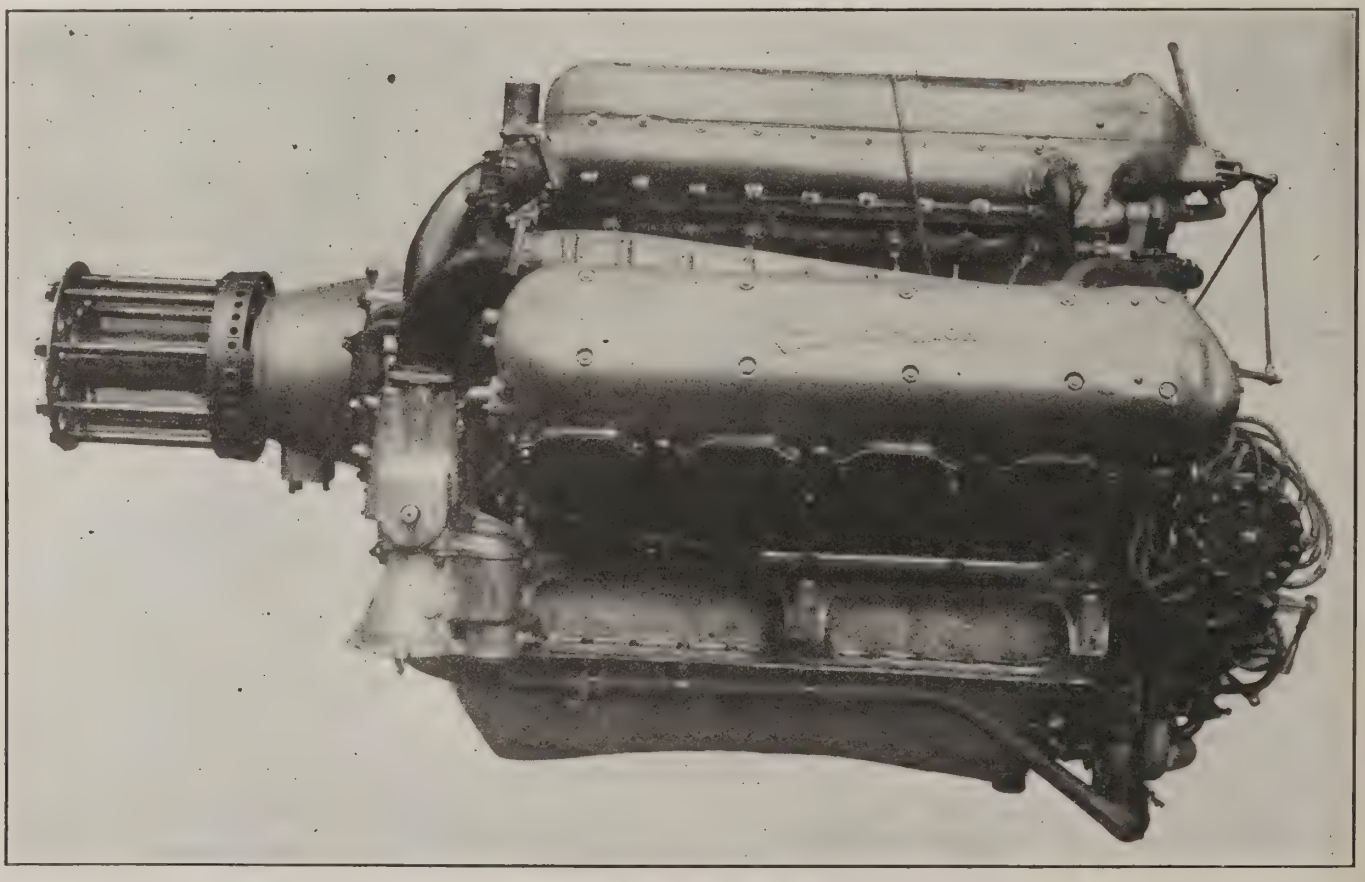
To bring the cylinder units as close as possible, flats or straights are machined on the foot-flanges, which are held down to the crank-chamber by an adequate number of studs, as well as by three pairs of dog yokes on either side, lapping on the adjacent flanges.

The most original feature of the Lion mass-construction, however, is firstly that the cylinders are not, as in most other models, formed as open barrels, but with crowns, through which four holes are machined for the insertion of paired valve-seatings. Secondly, these crowns are machined flat so as to fit the underside of the monobloc aluminum casting of the so-called "cylinder head," which is actually (*a*) a stiffening block for the whole construction, (*b*) a water-receptacle for the cooling, by direct convection, of the thin cylinder-crowns, (*c*) a vehicle for the gas passage, in common manifold on either side, and as a mount for the induction; also (*d*) in its upper part, as a cradle for the mounting of the entire valve gear of each cylinder group, and as an oil-tight container when its cover is fitted.

The head-block has, of course, a separate water inlet and outlet, the connection in the former case varying according to whether the motor is to be used as a tractor or a pusher. For a tractor both cylinder jackets and head-block are water fed from a small two-way union casting aft, direct from the pump inlet connection, the outlets for both being in front; but for a pusher, the feed is first through the inlet-runway of the cylinders, then through a union-casting into the front of the head-block, and then out to the radiator through a pipe bolted to the flange at the rear-end of the head. In other words, the circulation is in parallel for the tractor and in series for the pusher.

For attachment of head-block to cylinders, as the third point of this construction, instead of struts or colonnettes, the valve seatings, which are shouldered heavily, are screwed from within the cylinders—as open nuts, so to say—into the base of the head-block; thus to form the inner ends of the gas passages, as unions, and at the same time the strongest of attachments, 16 in all. The method of screwing in is not material; but the simple ingenuity of the system will be as patent to all connoisseurs of motor-mechanics, as its effectiveness is—as and when fitted.

Those who have reviewed, much more those who have wrestled with the complications and encumbrances of induction manifolding will be the first to appreciate Mr. A. J. Rowledge's reduction of the whole proposition to a simple trough-shaped tapered aluminum casting, bolted up to the common induction passage for all four cylinders, the other longitudinal half of which is formed in the head-block. This practice, though previously



The Napier "Lion" 450 H.P. aero engine

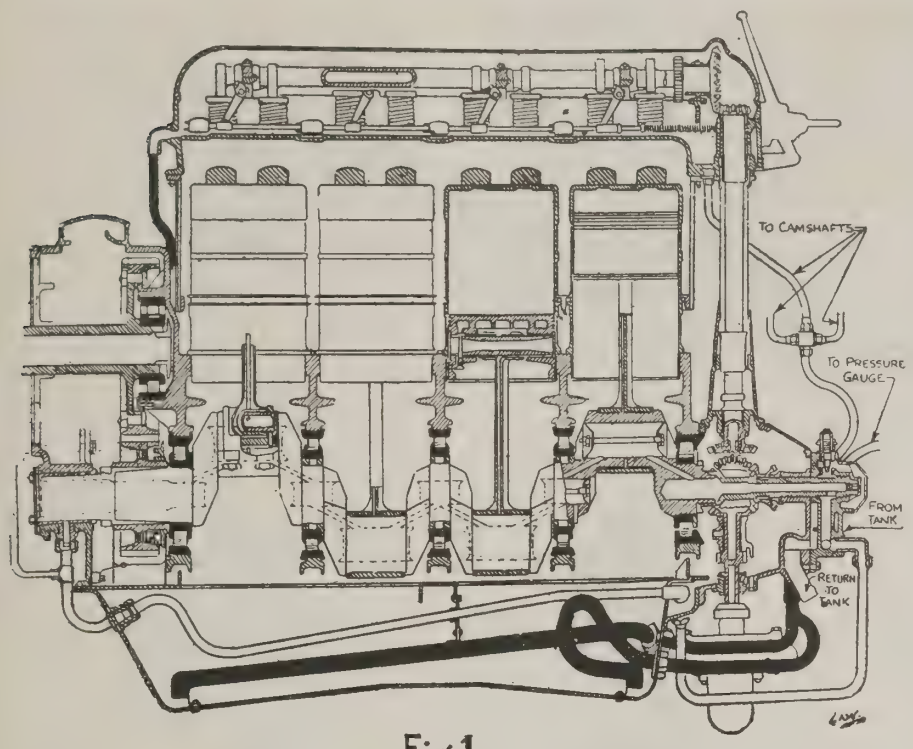


Fig 1.

Sectional elevation of middle group of cylinders, showing lubrication system. The return or scavenger leads are in black

employed for the exhaust of smaller motors, is new for induction; and both theoretically and practically is better than a tabular formation integral with the head casting, as promoting the cleaner coring and accurate water-wall thickness essential in so powerful an aeromotor. Its taper is further purposeful, to increase the gas velocity and consequent full charging to the rear cylinders; not so well achieved even by the American endless hoop or shorehaul induction with its encumbrance of end-unions.

In this case the connection forward—for the right hand and vertical group, looking forward—is by two induction trunks, hot water jacketed from the head-blocks, with serial water connections to the jacketing of an N.S.2 duplex Claudel-Hobson carburetor; a similar induction-lead construction to a single N.S.1 carburetor of the same make, serving for the left-hand group. In all three, the water leads are returned to one or other of the water pump inlets.

As to the carburetor control, suffice it to say that since forced induction for high altitudes is inappropriate, if not impossible in such a motor-design generally, the simpler—and only—alternative of petrol diminution is employed, and is effected by a certain method which more nearly equalizes the pressure in the mixing and float-chambers.

A further feature of the induction is the gas starter. Reference to the illustrations will show a connection set into the rear end of each induction passage cover. Each of these runs to the wall of a four-way distribution and equalizing cock. The inner drum of this device is so slotted, firstly, that it opens to each of the three induction connections in turn, while constantly open from the fourth connection; and secondly, so that, in the fourth or equalizing position of the control lever, it gives free communication between the three induction connections, while closing off the fourth connection from the charging apparatus.

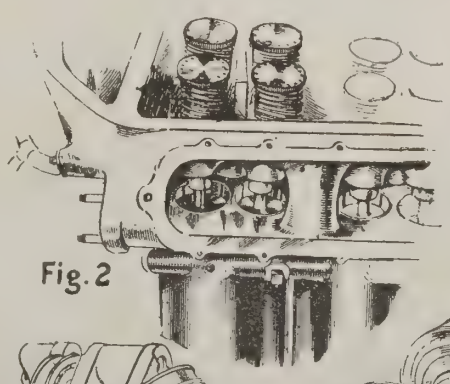
This last is a pipe running to a two-way cock set in the inter-connections of a special vaporizer and air pump device, which is mounted independently of the motor, in any convenient position in the cockpit. In one position this cock closes off the vaporizer and gives direct communication between the air-pump and distributor, so that each group of cylinders can be scavenged out in turn, while in the other position it cuts off that communication, and turning the whole of the air from the pump through the vaporizer, likewise passes the resulting explosive mixture from the latter to the distributor; so that each group of cylinders in turn can be charged with mixture impelled by the pump, when the motor may be fired by the hand-starting magneto.

The air-pump is of the ordinary hand-operated double-acting type, with leather faced, spring-controlled inlet and outlet valves at each end; while the atomizer consists essentially of a carburetor-construction of the concentric float type, having a horizontal spray jet beneath its choke tube, to which the petrol supply is controlled by a quadrant-set needle-valve. Above the choke-tube is an inverted cone-shaped mixing chamber containing four umbrella-like gauze-screens of varying mesh, mounted one above another. In this way all the heavier constituents of the petrol are caught and drained back to the tank or a waste-pipe; and the whole atomizer, except the needle-valve control quadrant, is contained in a pot-like jacket, which may be heated with exhaust gases or hot water.

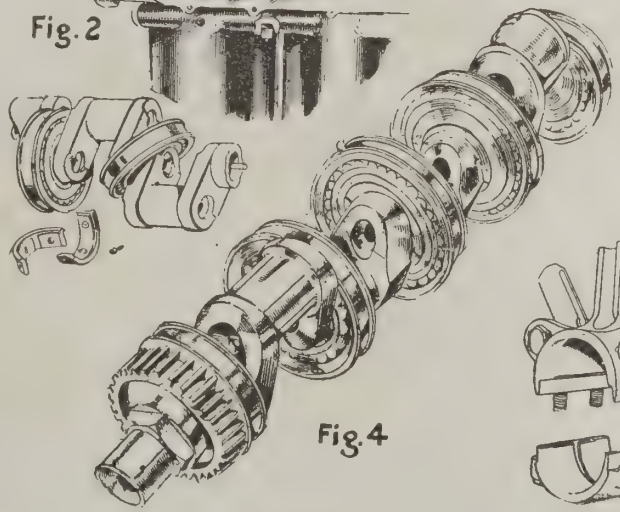
As for the exhaust, the single outlets from each cylinder are given any kind of manifold that suits the installation.

Coming now to the valve gear, this consists for each group, of two hollow camshafts, the cams of which act direct upon the adjustable tappet-heads of the valves; one shaft actuating the two inlets and the other the two exhausts of each cylinder. They are mounted in bronze bearings, in five cross webs in the cradle part of the head-block. One shaft is spur-gear driven off the other, in all three sets. Looking forward, for the right and left groups it is the inlet camshaft that is so driven, inwardly of the V, while in the vertical group is the exhaust camshaft.

The drive to the right and left groups is effected through bevel gearing from vertical drive-shafts—which for constructional assembly and dismounting purposes are in two parts, sleeve-united—mounted in long bronze sleeve-bearings at the top, around the union-sleeves, and at the bot-









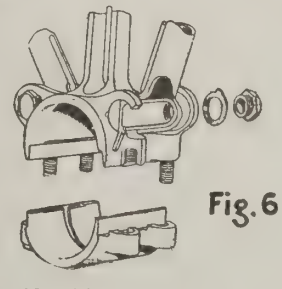


Fig. 2—Induction side of head-block. Fig. 3—Under side of head-block. Fig. 4—Crankshaft assembled with bearings. Fig. 5—Big end lubrication detail. Fig. 6—Big end construction detail

tom, above their driving bevels; each being enclosed within a tubular sleeve and lower encasement which constitutes a return for the excess valve-gear lubrication. Naturally, with the camshafts laid equidistant from the longitudinal axis of the head-block, the drive-shafts are off-set from the cylinder axes of each group to an appropriate angle. Also, the center one drives a tachometer, and the right-hand one a Remy distributor at half motor-speed; in both cases through skew-gearing located beneath the union-sleeves.

The valves, which are not interchangeable, the thickness of their stems differing, have wide hollow stems into which the tappet heads are screwed.

The distribution gearing, which is carried inside two castings bolted together, and to the back of the crank-chamber to form a detachable unit, is actually in two divisions. The first, that of the valve gear, consists of bevel gearing; the main driving bevel on the crankshaft engaging the drive-shaft bevels of the right and left hand groups, while a second bevel on the latter drive-shaft engages the drive-shaft bevel for the vertical group. This arrangement is manifestly necessary, as there would be no space for a third direct driven bevel among these smaller intermediate transmissions, in a progressive reduction to half speed, as between the first main drive bevel and the final driven bevels on the camshaft.

The second part of the distribution is from a one-piece double reversed bevel keyed upon a hollow extension-shaft; which is dog clutched into slots milled on the hollow crankshaft end and attached thereto by an open threaded ring enclosing both dogs and crankshaft end. The forward one of the two bevels engages another on the head of a spindle, which, immediately below this drive, carries a skew gear driving the two corresponding gears of the oil pumps, and is dog-clutched at the lower end to engage the water-pump spindle. The rearward driving bevel engages bevel pinions, right and left, to drive the two A.V.12 B.T.H. 12-cylinder magnetos—at one and a half-times the crankshaft speed—through vernier-adjusted, leaf-spring couplings from the intermediate pinion shafts to the magneto spindles.

So much for the essential mechanism and general arrangement of externals. The next interesting original feature of the Lion design—actually the most important component of the starting system—is the interconnected valve-relief control which enables the air-scouring and mixture-charging to be effected. This consists essentially of a set of T-shaped depressor-levers, four for each set of cylinders, which are anchored through lugs behind their shank-parts, to lugs beneath the camshaft bearings so that their T heads bear upon the tappet heads of the two forward valves of each cylinder; while the free feet of the shanks engage slots in a five-jointed spring-loaded pull-rod lying along the middle line of the valve-gear cradle at the bottom, with its rearward end brought through a bush in the cradle-end.

Now in the vertical group, this end of the rod carries a two-faced sheave-like collar, the inner face of which is engaged by the fork of a control-lever—anchored beneath to a bracket-arm on the head-block end—which, pulling out the rod, causes the T-pieces to depress the valves against their spring-pressure. At the same time the outer face of the collar engages the free arms of bell-cranks—also anchored to the head-block—the other arms of which are adjustably jointed to rods

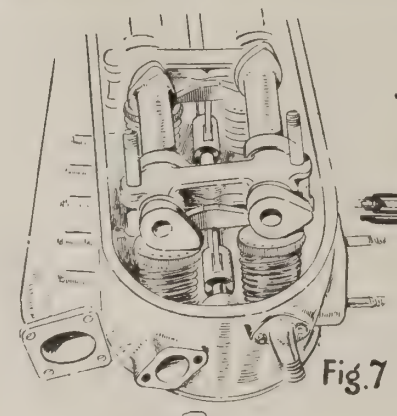


Fig. 7

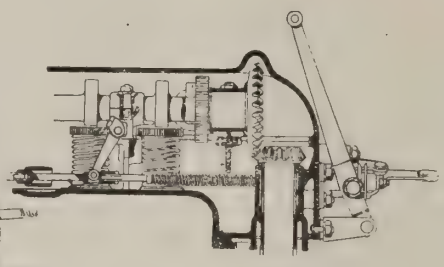


Fig. 8

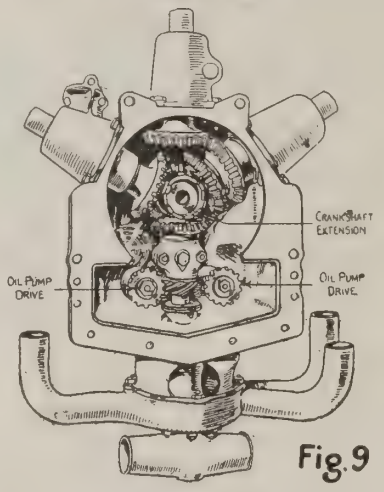


Fig. 9

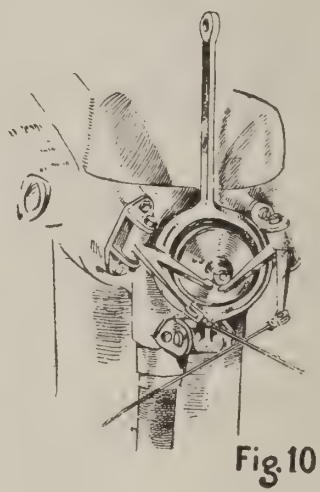


Fig. 10

Fig. 7—Detail view of valve gear, front right cylinder. Fig. 8—Starting gear valve control. Fig. 9—The distribution gear. Fig. 10—Starting gear control mounted on middle cylinder group

connected to other bell-cranks, likewise anchored to the right and left head-block ends, and engaging the ends of similar pull-rods actuating the depressors in those valve-gear cradles.

Recollections of the original Panhard auto-starting system—on the same charge-pumping principle generally—of later adaptations of similar systems for high-powered motors; air-bottle practice and so forth, might convey the impression that the charging in this instance was up to some degree approaching normal pre-combusion pressure. For while it is obvious that the exhaust valves must be held open for the air-flushing, it is equally clear that while they remain open, no charging with mixture above atmospheric pressure can be effected, as any such charge would escape. Again, there is the equalizer, suggesting its own function, as apparently to establish an equal charge-*pressure* in all cylinders alike.

Both the impression and suggestion are all the more plausible that in a vertical or even a V-type, however mechanically balanced or roller-borne as to its crankshaft, some such arrangement, with charging at three atmospheres or so, would probably be essential.

Nevertheless—none of them happens to apply! The facts, on the contrary, in this case are, first, that apart from the complication of having—as the only practicable method in the circumstances—to *lift* the equalizer cut-off sleeve to some position in which it cut out all *four* connections, its equalizing function does not apply at all for the operation of charging, but solely—and essentially, in default of such a total cut-out—for subsequent running. In brief, it acts as a junction-point for a kind of perpetual triplicate connection constituted by the three pipings, precisely like the far end of a three-way "shorehaul" induction. Secondly, the grouping of the cylinders being, not even at a V, but at the greater fanwise angle, the connecting-rod thrust angle upon the shaft is so much greater, and bears as from so many more radii at a time, that what with the reciprocatory-weight mechanical balance and the roller-borne crankshaft suspension in further aid, the series of slight explosion efforts of charges ignited at merely atmospheric pressure have been found sufficient for starting. Consequently to effect a start, it is merely necessary to hold back the control lever as far as it will go. Then the cylinder groups, one after another, are flushed with air: next—by the operation of the two-way cock—they are charged with mixture impelled from the pump, and merely filled with it; the lever is let go and the valves closed; and finally, the equalizer level is set in the equalizing position for all subsequent running-induction, and the motor is ready to be started on the hand-operated magneto.

Internally, the chief features of the Lion motor are the crankshaft, with the special method of fitting roller bearings on the three intermediate journals; the connecting rod fitting; and the internal sump-scavenged lubrication for which all these parts and the valve-gear generally act as conduits; the only external piping being the two rearward scavenging connections from the sump to the pump, an upward connection to the valve-gear, and a third one forward to the propeller reduction gear.

The crankshaft has its pins and journals hollowed, and closed again by bolt-connected, valve-like plugs to form oil-cells, and its webs drilled diagonally to form a continuous or serial-feed oil con-

duit from cell to cell. The problem of getting roller bearings on the intermediate journals has been solved—albeit at the compromise of paring the web-faces somewhat heavily, above and below—in what is understood to be the R.A.F. fashion of slipping the races of outsized bearings over the webs, and packing up to them with halved steel bushes, shouldered on one side and stopped on the other with a little butt-screw in the foot of the adjacent web; one half of the bush being keyed to the journal to enable it to turn solid, and in a driving fit under the roller race. Theoretically the power-saving gain from the use of line-contact, all-but-frictionless bearings, is obviously enormous. Practically, owing to the diameter of the peripheral circle of the rollers, in this construction, the peripheral speed seems high.

The end-journals, of course, present no such difficulties, and owing to the reduction spur-gearing at the end, no thrust-races are needed; the roller-bearings being simply housed in the crank-chamber ends; their inner races threaded on the shaft; the inner faces butted by the webs; and their outer ones, held rearwardly by a keeper plate, and forward by the oil-thrower ring which is stud attached to the driving spur gear. The extremity of the crankshaft is mounted in a plain bearing housed in the metal of the reduction gear drum. Being hollow, it serves as the entry from beneath of the forward oil-pressure lead, as brought through the base-chamber from the other end; and is merely closed with a removable plate to facilitate the flushing of the whole circulatory system with kerosene after every 50 hours flying.

The pistons cast from a certain aluminum alloy, carry four rings on their very short trunks. These are chamfered and bored through beneath the two lower rings—which are scrapers—so as to return all lubricant in the slightest excess into the base-chamber. The gudgeon pins are hollow, and thus form the final oil-con- split-pinned set-screw in each case, they do not oscillate in their steel bushes. Thus the oil-feed is necessarily intermittent, but only slightly so, owing to the slight angularity of the rod-head oscillation. On the other hand, it is frequently argued that the oil consumption is rather greater with a gudgeon pin thus fixed than in one that oscillates with the rod-head.

The connecting rod group in each case consists of a central I-sectioned—all-but sectioned—master-rod, the big end of which houses a bronze bearing, white-metal-lined, and has its shoe—likewise lined—united in a scarf joint and attached by four-studs; while the side-rods are tubular, and anchored to lugs on the big-end by hollow pins, so locked by end nuts that they cannot move endwise, and so held by snugs that they cannot rotate. Thus these pins constitute oil-cells, intermediate to the crank-pin oil-cells on the one hand, and the gudgeon pins on the other. Their oil supply, although direct enough through the bearings, by way of bored leads, is, of course, rendered intermittent by the crank-pin rotation. But their upward feed, like that of the master rod, is effected by external oil-pipes, returned against and into the rod-heads, and thence goes intermittently, into the gudgeon-pins.

Mechanically, the great distinction between this and similar connecting-rod unions for V, Y or "broad-arrow" type motors, is that the pin-anchorage is neither upon nor near the shank of the master-rod—which is thus not subjected to "necking" stresses—but is solely upon the mass of the big-end itself, into which the lugs are stoutly rooted.

As to the lubrication generally of the Lion motor, thanks to the appropriation of the extraordinary working conditions by Mr. A. J. Rowledge, it is indeed a true circulatory system. It would be no duits to the cylinder walls. As they are pinned in the lugs with a taper ended exaggeration to say that the motor to this extent is designed round its lubrication. It is possible that it might be further simplified mechanically in a detail or two; albeit that proposition is not readily visible. And a further point to note is that the so-called oil-sump is not actually a sump at all, but, what is much better for "dry" lubrication, an oil-pan sunk towards the ends. Consequently in any case, whatever angle the motor may take, such oil as may be in the pan must go to the scavenger-pipe at one end or the other.

The oil pump itself consists of a body cast in two halves cored for the requisite oil passages, and bored to take six intermeshing gears arranged in pairs, above and below, on three spindles. Two of these spindles, as previously stated, are driven by helical gears from the vertical oil pump driving spindle. The two lower gears in the front part of the body draw respectively from the forward and rear end of the sump, and deliver to the upper gears, which they drive. These deliver to the rear end of the crankshaft, thence to the adjustable relief valve, and by external tubing, to the pressure gauge, and camshafts; while the pair in the rearward body—in tandem with the right-hand gears in the front one—draw from the tank and deliver to the front end of the crankshaft and the reduction-gear. The return-leads are, as already stated, down the valve-gear drive-shaft sleeves lubricating upon the distribution gear, and, by the outside tubing, into the reduction gear.

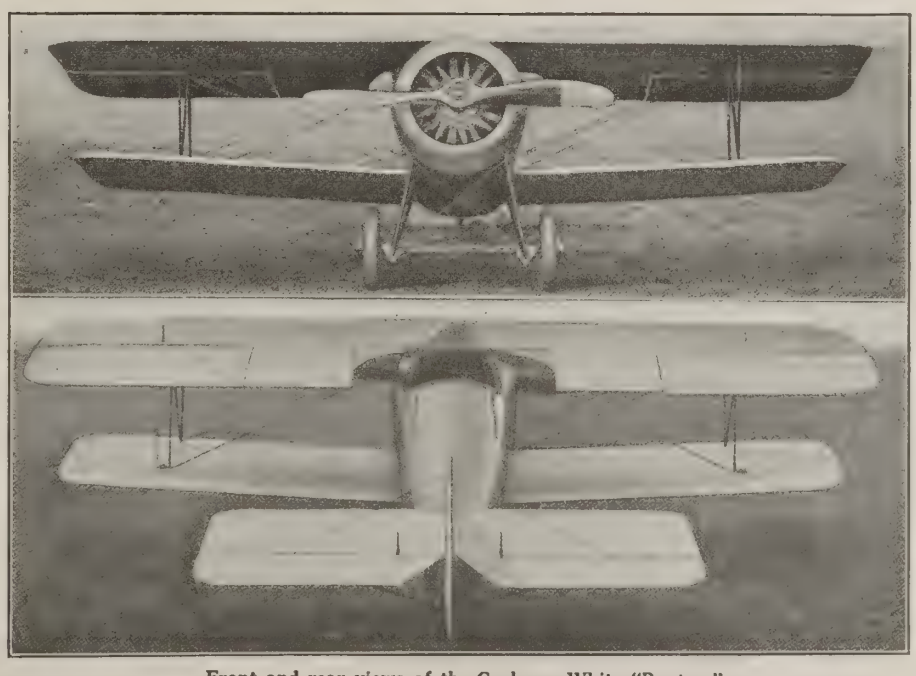
For the rest, the reduction gearing is mounted in roller bearings, housed in the drum-like upward extension of the crank-chamber; the propeller shaft, in addition, having double ball thrust bearings, housed inwardly of the outer roller bearing, so as to take all the thrust and allow the full benefit of the rolling-line contact of the latter to be obtained.

The final results of this design are that the entire motor, empty of lubricant, weighs only 1.79 lbs. per b.h.p. and only a fraction over 2½ lbs. per b.h.p. in running order with the water in the jackets; that the petrol consumption barely exceeds the b.h.p. hour half-pint, and the oil-consumption one gallon and a pint per hour for the whole.

THE GRAHAME-WHITE "BANTAM"

(*Continued from page* 729)

and through a heavy gauge wiring plate, the outer end of which serves as an anchorage for the lift cables, and the inner end of which is attached to a steel tube running horizontally across the bottom of the fuselage. Thus, when the machine is in the air this transverse tube is in tension owing to the pull of the lift cables, while during landing shocks it is put into compression owing to the angularity of the undercarriage front struts. The details will be clear from the sketch. At the bottom the two chassis struts meet on a short longitudinal tube to which the rubber cord is attached. At the point where the struts meet this tube internal reinforcement is provided to afford extra strength. There are two cross tubes in the undercarriage, one in front of the axle and one behind it. These are bolted to the chassis struts, the bolts passing through short lengths of tube welded into the struts, so that the compression caused by tightening up the bolts does not fall on the thin walls of the struts, but on the short lengths of tube welded into them transversely. The whole undercarriage is of the simplest type imaginable, and looks very sturdy for such a little light machine.



Front and rear views of the Grahame-White "Bantam"

USE OF ULTRA VIOLET LIGHT FOR TESTING BALLOON FABRICS

By JUNIUS DAVID EDWARDS and IRWIN L. MOORE, Bureau of Standards

Introduction

IT is quite necessary to be able to determine in advance of construction of a balloon the probable resistance of the fabric to the deteriorating conditions of service. Extensive tests made at the Bureau of Standards and other places have shown that reliable indications as to the relative lasting qualities of different fabrics can be obtained by testing after exposure to the weather.

Deterioration from exposure to the weather is due, among other things, to the combined action of light, heat and moisture. These conditions are extremely variable, and as a result tests made during different periods of the year are not comparable. For that reason it is highly desirable to secure a reproducible, and, if possible, accelerated aging test. The effect of exposure to heat has been investigated by Edwards,* Tuttle and Walen, and it was shown that the relative deterioration of balloon fabrics produced by heating was not a reliable indication of their durability in service. Exposure to light from an ultra violet lamp has also been suggested and used for obtaining an accelerated aging test, on the assumption that the ultra violet radiation in sunlight was one of the chief factors in the deterioration of balloon fabrics.

Rosenhain, Barr and Booth† exposed balloon fabrics to ultra violet light from a mercury vapor arc in a quartz bulb. Two fabrics, both of which showed marked deterioration on exposure to the weather for 50 days, were exposed to the ultra violet light for 64 days. The action of the light produced no significant change in permeability in the case of one fabric, whereas there was marked deterioraton in the case of the other.

Victor Henri‡ has studied the effect of ultra violet light on rubber. Using a mercury vapor arc in a quartz tube placed 20 cm. from the exposing floor, he ran tests on samples of thin sheets of rubber 0.5 mm. thick. He found that unvulcanized rubber showed marked deterioration in 20 hours; the rubber became dark and shiny and cracked easily when stretched. The vulcanized sheets took 48 to 72 hours before showing any marked deterioration. He concluded that the addition of compounding agents generally increased the resistance of the rubber to oxidation. Litharge was especially marked in this effect. On the other hand, antimony sulphide greatly facilitated oxidation. Applying his conclusions to balloon fabrics, he recommends that (1) in their construction there should be no unvulcanized rubber, (2) that the cloth shall be dyed with lead chromate or aniline yellow so as to form a screen to ultra violet light, (3) that some yellow coloring matter be used in the rubber itself.

Bureau of Standards Tests

The tests made at the Bureau of Standards were primarily for the purpose of determining the value of exposure to ultra violet light for accelerated aging tests on balloon fabrics. The light source used was a mercury vapor arc, taking approximately 600 watts, in a quartz tube. This was mounted with a reflecting screen on a frame painted black and the whole placed in a galvanized iron container through which air was constantly drawn by a fan at the top. Two samples of fabric, 11 inches square, were tacked on a frame so shaped that the fabrics were on a 120° arc of a cylinder (radius = 11″) of which the lamp formed the axis. Radiation measurements were made from time to time to determine the total radiation from the lamp and the percentage of ultra violet radiation. The radiation measurements were made by W. W. Coblentz and M. B. Long, and a description of the performance and characteristics of the lamp will be given in another report.

Numerous tests of balloon fabrics exposed to the weather have shown that normal aging is usually accompanied by a slow increase in acetone extract and an initial decrease in permeability which is followed by a very large increase in permeability when the gas film becomes brittle and cracks. The deterioration of the fabric can thus be judged by a comparison of the permeability and acetone extract determined before and after exposure. The permeability was determined by the Bureau of Standards' method as described in Technologic Paper No. 113; the permeability is expressed in liters per square meter per 24 hours. The percentage acetone extract was determined by the method described in the third annual report of the Advisory Committee previously referred to. The results of a series of tests on balloon fabrics after exposure to ultra violet light are given in Table 1. The results of similar tests of the same fabrics before and after exposure to the weather for 30 and 60 days are given in Table 2.

A brief description of each fabric is given in the following tabulation:

No. 22151—Two-ply fabric, olive green rubber coating on outside.

No. 23987—Two-ply fabric, gray rubber coating on outside.

No. 10650—Two-ply fabric, gray rubber coating on outside.

No. 24580—Two-ply fabric, olive drab dyed fabric on outside.

No. 22151X—Same construction as 22151 but from different roll.

No. 27331—Single-ply fabric coated with fine para rubber and sulphur.

No. 27291—Single-ply fabric, same coating as 27331 except that lamp-black has been added to the compound.

TABLE 1

Effect of Exposure of Balloon Fabrics to Ultra-Violet Light

Fabric No.	Test		Permeability (25° C) and Per Cent Acetone Extract after Exposure							
		Time of Exposure in hrs.	Original	43	144	158	162		360	196
		Total Radiation in gm. cal. per sq. cm.		1015	2675	2410	1317		7410	1575
		Ultra-violet radiation in gm. cal. per sq. cm.		670	1712	1495	738		4650	898
		Moisture Condition		Wet	Dry	Wet	Wet	Dry	Wet	Dry
22151	Perm.....		15.4	13.4						
	% Ac. Ex..		2.2	3.4						
23987	Perm.....		11.4	14.6						
	% Ac. Ex..		1.7	2.6						
10650	Perm.....		17.5		12.5	11.1				
	% Ac. Ex..		1.6		3.6	4.8				
24580	Perm.....		9.4		8.0	4.9			320.	
	% Ac. Ex..		2.0		5.5	7.2			13.9	
22151	Perm.....		15.4				10.1	12.1	17,800.	
x	% Ac. Ex..		2.0				5.8	4.8	15.6	
27291	% Ac. Ex..		1.3							4.7
27331	% Ac. Ex..		1.9							16.6

NOTE—All samples were wrinkled before testing for permeability by being drawn ten times over a metal edge (angle 90°) under a constant tension of one pound per inch.

The values given in the column marked "total radiation" are for all wave lengths from 0 to 1.2μ. The values in the column marked "ultra-violet radiation" are for all wave lengths from 0 to 0.45μ.

For the proper interpretation of the data obtained in these tests it is necessary to consider the character of the radiation to which the fabrics were exposed. The figures given in the table for total radiation from the mercury arc are for all wave lengths from 0 to 1.2μ. The total radiation for all wave lengths (from 0 to infinity) is, however, about five times as great. This is due to the large amount of heat radiated from the hot quartz tube and electrode. The values for the range 0 to 1.2μ have been used for purposes of comparison because over 80 per cent. of the solar radiation is of wave lengths less than 1.2μ. The visible portion of the spectrum lies approximately between the wave lengths 0.38μ to 0.77μ.

Measurements on the mercury arc show that the radiation changes in character and intensity during the life of the lamp. At first as high as 70 per cent. of the total radiation was of wave lengths shorter than 0.45μ (ultra violet); this percentage decreased steadily with use until finally only about 50 per

* Third Report of the Advisory Committee for Aeronautics (1917).

† W. Rosenhain, Guy Barr, and Harris Booth, Report of Great Britain Committee on Aeron., 1910-1911, p. 60.

‡ Le Caoutchouc et Gutta-Percha, 1910-7, pp. 4371-4376.

TABLE 2

Effect of Exposure of Balloon Fabrics to the Weather

Fabric No.	Test	Permeability (25° C) and Per Cent Acetone Extract after Exposure		
		Time of Exposure		
		Original	30 days	60 days
22151	Permeability	15.4	600.	27,000
	% Acetone Ex.	2.2	17.4	20.0
	Solar Rad.		11,400	21,000
23987	Permeability	11.4	14.3	12.1
	% Acetone Ex.	1.7	3.1	3.7
	Solar Rad.		8,500	15,600
10650	Permeability	17.5	19.5	8,750
	% Acetone Ex.	1.5	14.4	24.8
	Solar Rad.		11,400	21,000
24580	Permeability	9.4	14.2	14.1
	% Acetone Ex.	2.0	2.9	5.7
	Solar Rad.		7,400	13,400
22151x	Permeability	15.4	6.1	1.8
	% Acetone Ex.	2.0	9.1	18.9
27291	% Acetone Ex.	1.3	11.5	
27331	% Acetone Ex.	1.9	31.	

NOTE—"Solar Radiation" is expressed in gram calories per square centimeter of horizon al surface for wave lengths from 0 to 1.2W. These values were calculated from the daily observations of the Weather Bureau at Washington.

NOTE—All samples were wrinkled before testing for permeability by being drawn ten times over a metal edge (angle 90°) under a constant tension of one pound per inch.

cent. of the radiation was ultra violet. The intensity decreased at the same time until it was only about one-third of the original value.

For purposes of comparison there is given in Table 3 the approximate composition and intensity of the radiation from the mercury arc and the sun. The values for solar radiation are for average summer conditions in Washington and the values for the lamp are an average of the conditions under which the fabrics were exposed. The intensity and distribution of radiation from the two sources is shown by this table to be quite different. The rate of radiation of ultra violet light is about three times as great from the lamp as from the sun. Even this radiation is not of the same character as that from the mercury arc, as most of the ultra violet radiation from the sun is of wave lengths between 0.4μ and 0.3μ, while the ultra violet radiation from the mercury arc extends below 0.2μ.

A consideration of the data in tables 1 and 2 shows that exposure to the ultra violet light produces deterioration comparable qualitatively at least with that obtained by exposure to the weather. It was found, however, that the action of the ultra violet lamp was not nearly as rapid as had been hoped for. For example, fabric No. 22151 showed rapid deterioration in summer weather in less than two weeks, whereas under the ultra violet light there was no marked deterioration in 43 hours. For this reason it was necessary to extend the period of exposure in order to secure positive evidence of deterioration.

Further experiments showed that it required between 162 and 360 hours' exposure to secure complete deterioration of fabrics Nos. 22151 and 24580. Practically the same result was obtained after 30 days' weather exposure in the case of No. 22151, while the deterioration under the lamp in 360 hours was greater in the case of 24580 than in 60 days' exposure to the weather. Judging from service tests and weather exposure tests fabric No. 24580 is far superior to No. 22151 and yet the exposure to ultra violet light shows only a slight difference in their resisting qualities. Even when the amounts of ultra violet radiation were the same in both outdoor and mercury arc exposures the degrees of deterioration produced were very different. In the case of fabric No. 22151 the ultra violet radiation from the sun during 30 days' exposure to the weather was 700 calories; during 43 hours' exposure under the lamp the ultra violet radiation was 670 calories. Yet this fabric showed no significant deterioration in 43 hours under the lamp, but was practically destroyed by 30 days' outdoor exposure. Take another example: Fabric No. 10650 during 158 hours' exposure under the lamp did not show very great deterioration, but was ruined by 60 days' weather exposure. The ultra violet radiation in the first case was 1,495 calories and in the second case 1,300 colories.

Tests were made to determine, if possible, the influence of moisture on the rate of deterioration. In the tests marked "wet" the samples were sprayed with water twice daily. The "wet tests" show a somewhat more rapid action than those made with the fabric dry. That the diffierence between tests made under the two conditions is not greater is probably due to the fact that the normal humidity of the air in the room is sufficient to maintain an appreciable percentage of moisture in the "dry fabric."

The effect of temperature upon the deterioration is a factor the influence of which is hard to estimate. Fabrics exposed under the lamp were at a temperature of about 50° C. Fabric No. 22151 when exposed in bright sunshine in midsummer frequently reached this temperature. In general, however, the temperature of fabrics under outdoor exposure was lower than those under the lamp.

Conclusions

It seems evident from these few tests that the relative deterioration of different fabrics under ultra violet light is not strictly comparable with the deterioration experienced in service or in outdoor exposure. The radiation from the mercury arc lamp varies greatly in intensity and character and exposures made at different times are not strictly comparable; moreover, it is not practicable in most laboratories to measure the radiation from the lamps. The tests are thus far from being reproducible and are not particularly accelerated compared with summer exposure in Washington.

TABLE 3

Comparison of Solar Radiation with Radiation from Quartz Mercury Lamps

A. Comparison for all Wave Lengths 0 to ∞

Wave Lengths of Radiation in W	Solar Radiation at Washington		Mercury Arc Radiation	
	Gram Cal. per Sq. cm. per sec.	Percent of Total	Gram. Cal. per Sq. cm. per sec.	Percent of Total
0 to 0.45	0.0008	5	0.0026	12
0.45 to 1.2	0.0121	78	0.0017	8
1.2 to ∞	0.0026	17	0.0176	80
0 to ∞	0.0155	100	0.0219	100

B. Comparison for Wave Lengths less than 1.2 μ

0 to 0.45	0.0008	6	0.0026	60
0.45 to 1.2	0.0121	94	0.0017	40
0 to 1.2	0.0129	100	0.0043	100

The values for solar radiation were calculated from data given in the Smithsonian Physical Tables.

The values for the radiation from the mercury lamp are for a distance of 28 cm. from the quartz tube and are an average along its length.

EFFECT OF WRAPPING ON THE STRENGTH OF AEROPLANE STRUTS

THE practice of wrapping aeroplane struts or wing beams with canvas developed under the supposition that such wrapping increased the strength of the members at critical points, prevented sudden failures, and kept out moisture. Wrapping has been advocated especially for cross-grained material in order to make available for aeroplane construction stock which would otherwise be rejected.

Extensive tests have been made at the Forest Products Laboratory for the United States Air Service to determine the reinforcing value of such wrapping. These tests were made upon cross-grained struts of Sitka spruce and Douglas fir partly or entirely covered with Bakelized canvas or the standard cotton tape, and upon some of the same struts with the wrapping removed.

The conclusions reached from the tests were as follows:

The addition of Bakelized canvas to cross-grained struts increases the load somewhat but decreased the load per unit weight; it also increases the deflection and work to final failure and hence the shock-resisting capacity of the struts.

Wrapping cross-grained struts with cotton tape according to standard methods has no appreciable effect on their strength. It is doubtful if any other methods of wrapping, such as cording, would increase the strength properties very greatly. There is also the probability that any wrapping or covering will be loosened by weather changes.

It is believed that canvas, tape, or cord covering is of less value than the same volume of wood, and since such a covering is likely to be heavier than wood it is of still less value when compared with the same weight of wood.

The AIRCRAFT TRADE REVIEW

National Aeroplane Co. Doing Large Passenger-Carrying Business in Southwest

Fort Worth, Texas.—The National Aeroplane Co., a $5,000,000 corporation, successors to the Fort Worth Aerial Transportation Co., is operating an aerial passenger service between the following cities: Wichita Falls, Gainesville, Waco, Austin and San Antonio, Texas, and Ardmore, Oklahoma, where they have established sub-stations and landing fields.

The plans of the corporation provide for early extension of routes to as far as Kansas City and Denver, and the success of the project so far makes the directors of the corporation predict that they will be operating a hundred landing fields within a few months.

Chinese Purchase American-Built De Havilands

Toy Gon, former director of the Chinese Air Service and a member of the special commission appointed by the Government, has purchased a number of De Haviland aeroplanes equipped with Liberty motors. He has also negotiated with certain firms to supply commercial machines. Arrangements have been made for their immediate shipment to China.

Aircraft Factory Equipment and Tools On Sale by Air Service

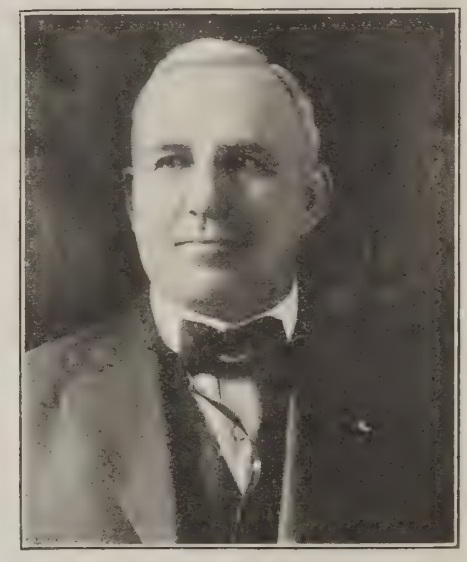
Washington, D. C.—According to an announcement from the War Department, there is available for sale machine tools used in aircraft production valued at $11,000,000. It is expected to dispose of some of these in Europe.

No Radiator Trouble for NC Boats

Engine radiators played a very important role in the equipment of the NC seaplanes. Not only were the engines of all these planes perfectly cooled, but undoubtedly the radiator of the NC-3 helped to preserve the lives of officers and crew for it will be recalled that Commander Towers and his men subsisted for fifty hours upon chocolate and *fresh* water drawn from the radiators when they came down in the fog this side of the Azores, after flying over 1,000 miles. NC-4, which so splendidly accomplished the record-breaking flight, like her sister ships, did not experience even the semblance of trouble with the engine-cooling units.

During the war the Navy Department used many G & O Radiators. Therefore, when the transatlantic flight was first conceived, naval officers together with the G & O engineers began work on radiator specifications for the projected voyage. When approval of the specifications was finally secured orders were placed and only three days' time in which to complete radiators, from blueprints to finished product, for the most important flight in the world's history was allowed. The twelve radiators for the three planes were completed in every detail and finished on time. They were quickly followed by spares, but as none of the original radiators were replaced since the time they were installed at Rockaway, they were not needed.

The terrific strain which these boats underwent and the fact that the radiators successfully withstood the gruelling test is a high tribute to the radiator equipment.



W. W. Mountain, vice-president and general manager of the Curtiss Aeroplane & Motor Co.



Service Motor Truck Co. delivers parts from Wabash, Ind., to the Firestone plant at Akron. From left to right: Harold Brooks, H. S. Firestone, W. E. Duersten

Personal Pars

Capt. Henry E. Reece and Lieut. Nathan P. Oakes, using a Curtiss H, flew from Providence, R. I., to Washington, D. C., a distance of 448 miles in 300 minutes.

Flying a Handley Page on a flight from Elizabeth, N. J., to Ellington Field, carrying four officers and two soldiers, covered the 285 miles between Montgomery, Ala., to New Orleans, La., in 270 minutes.

Joseph Leopold has resigned his position as sales manager of the Jones-Motrola Co. in order to associate himself in a similar capacity with the Trego Motors Corporation of New Haven.

James A. Wright, W. Ruben Fisher, W. E. Jominy, Albert Harwith, William J. Kurth and L. F. Merritt, all of whom were engaged until recently in the Bureau of Aircraft production, have formed the Wright-Fisher Engineering Company at Detroit. The company will engaged in the designing of tools, dies, jigs, fixtures, special machinery, automatic machinery, heat treating equipment, etc.

Harry S. Finkenstadt, who enlisted in the aviation corps shortly after the United States' entry into the war, has recently been honorably discharged and returned to Detroit as western sales agent of the Carbon Steel Co., Pittsburgh.

L. R. Scafe, who was comptroller of the Dayton-Wright Airplane Co., Dayton, is secretary and treasurer of the American Finance Investment Co. of that city.

C. B. Kirkham, formerly chief engineer of the Curtiss Aeroplane and Motor Corporation, of Buffalo, and the Curtiss Engineering Company, of Garden City, L. I., has opened an office at 15 East Fortieth Street, New York. Mr. Kirkham is acting as consulting engineer for aeronautical companies, and is designing a line of aeroplanes and engines, which he has in mind for some time. He is also working on a plane for the Post Office Department. Mr. Kirkham is also directing the New York Office of the Deposited Metal Products, of Newark, N. J.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative

PILOTS

Dana C. DeHart
Edward V. Gardner
Ira O. Biffle
Leon D. Smith
Gilbert G. Budwig
Trent C. Fry

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

PILOTS

E. Hamilton Lee
Lester F. Bishop
Carroll C. Eversole
John M. Miller
Charles E. Bradley
Max Miller
Frank McCusker

Manila Aero Club Demonstrates Aerial Mail to Director of Posts

Manila, P. I.—Flying under the auspices of the Manila Aero Club, Miss Ruth Law completed a series of mail-carrying flights before the Director of Posts and government officials. Plans for the establishment of a training field have been completed and arrangements for the purchase of planes are being made.

Official conferences have been held and the advantages of aerial mail for linking up the island demonstrated. Miss Law stated to the postal authorities that landing fields at intervals of perhaps ten miles will be required.

Aero Mail Service Between New York and Chicago Starts Next Week

It was announced by James B. Corridon, superintendent of aerial mail service of the Post Office Department, that the New York-Chicago aerial mail route will be placed in operation next week. At the same time the New York-Washington service will be transferred to Newark which will be the eastern terminus of all aerial mail routes.

The inauguration of the Chicago route from this field and the change of terminus for the Washington route, Mr. Corridon says, will mean the transfer of the Belmont Park station to the Newark terminal. The eight or nine aeroplanes now used on Long Island will be increased to fifteen, and all will be stationed in Newark, which will be the distributing point for supplies.

Mr. Corridon announced that the War Department has arranged to use the Newary station as a landing field. All aviators, whether in a private or commercial capacity, will be permitted to land at the field as long as it does not interfere with aerial mail operations.

Charles E. Bradley, Formerly of 271st Bombing Squadron in Aerial Mail Service

Charles E. Bradley, one of the newly appointed aerial mail pilots, was born at Sedan, Kansas, September 26, 1894. He graduated from Northwestern University, Chicago, Illinois, in 1916. His aeronautical ground school work was commenced in June, 1917, at the University of Illinois. He received his first instruction in flying at Wilbur Wright Field, Dayton, Ohio, in September, 1917, and later transferred to



Charles E. Bradley, former army aviator, now an aerial mail pilot

Ellington Field, Houston, Texas, to receive advanced training in flying. After completing a course in a bombing school he was assigned to duty with the 271st Bombing Squadron at Aberdeen Proving Grounds, Maryland.

He remained at this field, testing and experimenting with aerial bombs and bombing devices, until discharged on November 29, 1918.

He entered the Aerial Mail Service on March 30, 1919, and was assigned to the New York-Washington route, where he has been performing excellent service.

Room for Mail Clerk on Lawson Postplane

Washington, June 3.—Recent requests for bids for aeroplanes by the Air Mail Service resulted in eight bids, of which the lowest are from the Lawson Air Line Co., Milwaukee, which has designed a plane embodying mail car equipment, and allows for the employment of a mail clerk en route. The engines will be installed by the Government and it is expected that the Liberty engine will be used.

The aeroplane is of the biplane type, with the chassis built between the two wings, with engine space provided at each side. There is sufficient space so that the men can walk around the body, which is enclosed in glass. A rack has been designed in which the mail may be distributed during the flight, and a drop chute allows for the discharge of mail bags at principal cities without stops. A model of the plane has been ordered and will be demonstrated here when completed.

French and British Air Mail Services Carry 100 Tons of Mail During April

The following details regarding the working of the French aerial services have been given out by the French Bureau of Military Aeronautics:

On the semi-official Paris-Brussels line 34 trips have been accomplished, but more could easily have been carried out if necessary. On the Paris-Lille route, in 61 days between February 7 and April 10, 378 mail-bags weighing 78 tons were carried without accident. From April 1 to April 10 in 20 flights there was only one motor breakdown.

On the Paris-Bordeaux line, which is still in an experimental stage, from March 23 to April 29 there were 23 flying days, and 60 mail-bags, totalling 11½ tons, were transported. There were three smashes. The average time was four hours. The Paris-Strasbourg line, serving as a *liaison* with General Headquarters and the Government, between April 7 and April 13 made 15 voyages, carrying 128 bags, dispatches and newspapers, totalling six tons.

An interesting experiment in night mail carrying has recently been carried out by the R.A.F. authorities. A D.H. 10 machine with two 412 H.P. Liberty engines from No. 120 squadron left Hawkins Aerodrome, near Folkestone, at 10.30 P. M. and flying straight through without a stop reached Cologne at 1.30 A.M. The course taken covered about 300 miles, and as there was a fairly strong adverse wind the performance at an average speed of 100 m.p.h. was particularly good. This squadron, in conjunction with No. 110 squadron at Maisconelle, the transference point in France, has been responsible for the regular Folkestone-Cologne mail service, which has been flown since March 1. During the period March 1 to April 26 the squadron has carried no less than 1,634 bags of mails. In spite of exceptionally bad weather during a large portion of this period, particularly in March, there were only ten days upon which mails were not carried. The total number of mail flights made in these 47 days was 289.

NAVAL and MILITARY AERONAUTICS

Six Thousand From Air Service in Officer's Reserve Corps

Washington, D. C.—Appointees in Officers' Reserve Corps from the Air Service up to and including close of day, June 2, 1919, are as follows: Majors (flying) 21, (non-flying) 85; captains (flying) 79, (non-flying) 255; first lieutenants (flying) 401, (non-flying) 557; second lieutenants (flying) 3,670, (non-flying) 1,703; (balloon) 15. Totals: flying officers, 4,171; non-flying officers, 2,600; balloon officers, 15.

Colonel Frank Lahm Awarded D. S. M.

Washington, D. C.—The War Department authorizes publication of the following cabled communication from the Commander-in-Chief of the American Expeditionary Force:

"Pursuant to authority contained in cablegram A 2830, I have awarded the Distinguished Service Medal to the following American officers:

"Colonel Frank P. Lahm, Air Service, U. S. A. For exceptionally meritorious and distinguished services. A balloon pilot of marked ability and scientific attainments, he rendered valuable services to the American Expeditionary Forces by his untiring devotion to the innumerable problems which faced the Air Service during its organization in France. His broad experience in aeronautics played an important part in the formulation of policies of the Air Service and was reflected in its successes during the St. Mihiel offensive and subsequently in the operations of the Second Army."

Mitchel Field, Near New York, Purchased By War Department

The United States Government has practically completed arrangements for the purchase of Mitchel Flying Field at Hempstead, it is announced. The purchase price is understood to be about $450,000. The land was already under lease. Several million dollars had been expended for housing and equipment to make it the first field in the East. It is to be the centre of Government aviation in the East.

Lieutenant Emmons Received Distinguished Service Medal

Washington, D. C.—Lieut. Harold H. Emmons, in charge of aeroplane engine production, received the Distinguished Service Medal "for especially meritorious and conspicuous service as Chief of the Engine Production Department of the Air Service."

American Aviators Destroyed 755 Enemy Planes

Washington, D. C.—American fliers inflicted on the Germans double the loss they suffered in aeroplanes and balloons. An official report announced that 755 German planes and 71 balloons had been destroyed, while the American losses were 357 planes and 43 balloons, only victories which have been absolutely confirmed being credited to American fliers.

Board to Pick Air Defense Site

Selection of a site for a combined land and water coast defense station in the vicinity of San Francisco is to be made by a board appointed by the Secretary of War, which began its meetings at the headquarters of the Western Department at San Francisco recently.

The board, which will submit recommendations to the adjutant general, through the air service director, is made up as follows: Col. Alfred M. Hunter, C. A. C.; Col. Charles M. Potter, Engineer Corps; Col. H. H. Arnold, A. S. A.; Lieut. Col. C. T. King, Medical Corps; Major Albert D. Smith, A. S. A.

Air Service Officers in Cross-Country Flights

The War Department authorizes publication of the following from the Office of the Director of Air Service:

Lieut. Colonel Leonard H. Drennan, air service officer of the Northeastern Department, pilot, has reported the completion of an air flight between Boston and Hazelhurst Field, Long Island, reporting the distance covered 175 miles and the time as 83 minutes. Lieut. Colonel Drennan was accompanied by Lieut. Willis R. Taylor, as passenger. The flight was made in a De Haviland 4 plane at an elevation of 8,000 feet.

Colonel Davenport Johnson, commanding officer of this field, with Lieut. H. S. Ormsbee, pilot, in a De Haviland 4 made the flight from Chicago to Selfridge Field, Mt. Clemens, Mich., 250 miles, in 140 minutes, at an altitude of 5,000 feet. Between Michigan City and Chicago the aviators were over Lake Michigan a part of the way.

Lieuts. Andrew J. Hutterly, pilot, and William N. Cunningham have just completed an interesting flight over the mountains in Virginia and Pennsylvania as far west as Beaver Falls. The complete circuit of flight covered 1,000 miles and was made in 620 minutes flying time. The altitude varied from 1,000 to 8,000 feet, the latter on the last leg of the flight from Washington to Langley Field, Va. A Curtiss J.N. 4-H was used.

Air Service Gives Problems for Inventors to Solve

The Equipment Section of the Engineering Division have certain devices, appliances, etc., which they desire to develop. The following list is printed in order that inventors and designers may be familiar with a small number of our problems.

The particular problems referred to are:

Gasoline Tanks. A tank is desired which will withstand a salvo of fifteen shots fired at a range of thirty yards, the ammunition consisting of calibre 30, equally mixed, service, tracer, incendiary and armor-piercing bullets, fired through the tank at the most vulnerable angle without fire occurring, in ten consecutive tests on as many tanks. Naturally, the weight should be kept as low as possible and the maximum limit is about 75% more than usual standard tank weight. We will, of course, furnish all information to any one who desires it, regarding previous experiments.

Air Bag Floats, Landing Skids, etc. The object of these devices is to prevent machine from capsizing when landing in water, then remaining afloat. The British have made a fair success using these floats, but it would be desirable to have people start thinking about it.

Portable Hangars for Field Service. The present hangars, usually made of canvas, are unsatisfactory, and the usual drawbacks are either that they blow down in winds or that they leak or hold water in pools, or are too small. Any such hangar should be capable of housing at least four De Haviland planes with room enough left for working on them. They should incorporate the necessary wiring for electric lights and plugs for extension lamps.

Gasoline Supply Gauges. Much is to be desired with regard to a suitable gasoline supply gauge. The gauge should be responsive, serviceable, and accurate to the last one-half gallon. At present, the mounting for the gauge can be left on the tank, as it is thought that the mounting on the dash board will offer too many complications, unless done electrically.

Central Electric Power Plant. By this is meant the designing of a single generator and battery which will furnish the power required for the radio installation, the heating and lighting installation, the electric starter, the ignition, the motor driven camera; together with the necessary, perhaps, transformers to supply these various apparati with the electrical energy needed in its proportion and kind. This is to be engine driven in some way, and this will do away with the head resistance of the various wind driven generators now used. Of course this must, as it most surely will, manifest a saving in weight. The motors for which this is most desired are the Liberty 12 and the Hispano-Suiza 300. Two ideas are desired, viz.: the application to those engines already produced and simpler design to be incorporated in engines to be produced in the future.

Mobile Independent Cranking Device. This to be mounted on an auto truck. This device is to be an electrically driven cranker for planes not equipped with self-starters and is to be mounted on a motor truck. It is to be used at an aerodrome. Our idea of this device is one mounted on a truck that can be backed up to the front end of any aeroplane, then a flexible arm attached to the propeller. The electric energy is then to be brought into play which will crank the engine and cause the engine to begin firing. When the engine picks up, the device should be automatically thrown out of connection with the propeller.

Official Figures Issued on Air Service

On May 24, 1919, Air Service property consisting of 4,608 Curtiss OX-5 motors; 1,616 JN4-D Curtiss type planes, without motors; 1,100 Standard J-1 planes, without motors; with accessories and equipment now with the planes and motors, were sold to the Curtiss Aeroplane & Motor Corporation for $2,720,000.

It is estimated that the planes and engines, without the accessories and other equipment, were originally valued at approximately $22,500,000. During the summer of 1918 the Air Service discontinued the use of the SJ-1 plane; the JN4-D was recently declared "obsolescent."

Planes and Engines Condemned to April 30.

From the beginning of the war to April 30, there were condemned 1,105 planes and 853 engines of all types. The distribution by types is shown in the following table. Figures do not include Navy models and machines discarded shortly after the beginning of the war.

Primary Training	
Planes	861
Engines	713
Advanced Training	
Planes	211
Engines	129
Service	
Planes	33
Engines	11

Active, Obsolescent, and Obsolete Planes and Engines on Hand May 5.

In the following table is shown the status of service and training planes and engines in the U. S.

Orders issued by the Air Service in February classify aeroplanes as "Active," "Obsolescent," and "Obsolete." "Obsolescent" planes and engines are to be used until the supply is exhausted, but no extensive repairs are to be made or additional spares manufactured.

	New	Used, but in flying condition	Out of comm.	Total	Per cent — New	Per cent — Used, in comm.	Per cent — Out of comm.
ACTIVE							
Service engines	10,081	288	225	10,594	95	3	2
Service planes	2,127	167	163	2,457	86	7	7
Training engines	2,007	608	122	2,737	73	22	5
Training planes	773	980	488	2,241	34	44	22
OBSOLESCENT							
Training engines	4,480	3,942	2,214	10,636	42	37	21
Training planes	539	1,804	612	2,955	18	61	21
OBSOLETE							
Engines	1,419	158	963	2,540	56	6	38
Planes	1,026	65	940	2,031	51	3	46

34 Per cent of Aviation Engines Received in A.E.F. Were American Built

According to reports received from the Chief of Air Service, A. E. F., the total number of engines received up to November 30, 1918, was 10,464. Of this number 4,153 were Liberty 12's.

The number and per cent received from American and European sources follow:

	Number	Per cent of total
European	6,944	66
American	3,520	34
Total	10,464	

Service Planes Dispatched to American Forces in Zone of Advance

The total number of aeroplanes dispatched to the American Forces in the Zone of Advance to November 11, 1918, was 2,698. Of this number the British and French supplied 75 per cent.

Following is the number sent to the Zone of Advance and the per cent of total supplied from French, American and British sources:

	Number	Per cent of total
French	1,825	67
American	667	25
British	206	8
Total	2,698	
Total British and French	2,031	75

Special Orders Nos. 130-134, Inclusive

Capt. Charles S. Shotwell is appointed an acting quartermaster for the purpose of issuing bills of lading for the Material Disposals Section of the Bureau of Aircraft Production; vice Capt. Robert G. Woodcock, is hereby relieved.

The following named officers will proceed to Park Field, Millington, Tenn.: Second Lieuts. James D. Stewart, Manuel A. DeBettencourt, John R. Newell.

Capt. Everett J. Lee will proceed to Fairfield, Ohio, and report to Wilbur Wright Air Service Depot.

The following-named officers will proceed from Naval Air Service station, Pensacola, Fla., to Washington, D. C., on temporary duty not to exceed five days; thence to Hampton, Va., and report in person to the commanding officer Langley Field for duty: First Lieut. LeWallace W. Taylor, Second Lieuts. Theodore E. Faulk, Robert H. Finley.

The appointment of Second Lieut. Emmanuel Franklin, for the period of the existing emergency, to the grade of first lieutenant, with rank from June 6, 1919, is announced.

Second Lieut. Robert B. Howard, will proceed to Hazelhurst Field, Mineola, Long Island, N. Y., thence to Fort Hancock, N. J., thence to Little Silver, N. J., on temporary duty; thence to Hazelhurst Field, Mineola, Long Island, N. Y.

Second Lieut. William A. Gardner, will proceed to Kelly Field, San Antonio, Texas, for duty.

Maj. Robert Coker, will proceed to Washington, D. C., and report in person to the Director of Air Service.

Second Lieut. Ernest S. Hansberger will proceed to Washington, D. C., and report to the Director of Air Service.

Second Lieut. John F. Cullinan is detailed for duty with the Medical Department, and will proceed to Fort McHenry, Md., and report to the commanding officer, U. S. A. General Hospital No. 2.

First Lieut. Ector O. Munn, is relieved from his present duty as assistant to the military attaché, Archangel, Russia, and will repair to Washington, and report to the Director of Military Intelligence for temporary duty, and upon the completion of this duty he will report to the Director of Air Service for duty.

First Lieut. Ralph E. Jones, will proceed to Aberdeen, Md., and report to the commanding officer Aberdeen Proving Grounds.

Second Lieut. Gladstone Rowe will proceed, accompanied by the necessary attendants, to Biltmore, N. C., and report to commanding officer, U. S. A. General Hospital No. 12 for further treatment.

The following-named officers will proceed to Langley Field, Hampton, Va.

Capt. Russell E. Collins, First Lieuts. Byron T. Burt, and Don R. Cameron.

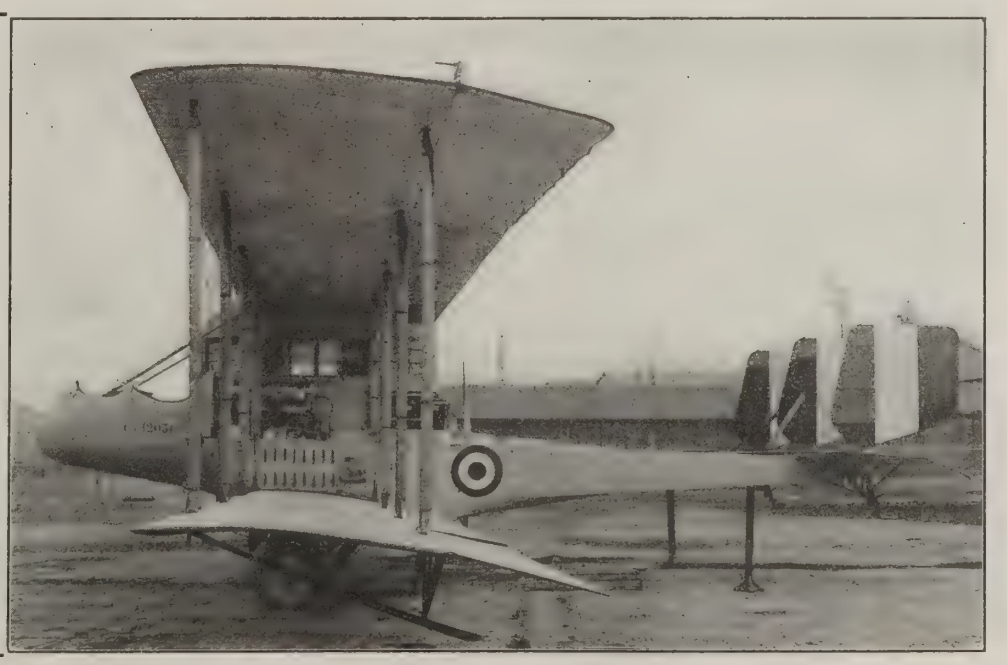
Second Lieut. Daniel F. Duke will proceed to Rockwell Field, San Diego, Cal.

Second Lieut. John T. Belting is detailed for duty under the direction of the Director of Purchase, Storage and Traffic, and will proceed to Hoboken, N. J., and report to port of embarkation for assignment.

Second Lieut. Jack Greer will proceed to Chanute Field, Rantoul, Ill.

Capt. Horace Green will report to the Director

(*Continued on page 746*)



The Caproni "600" Biplane which carries 11 people; 3 pilots outside and 8 passengers inside. Wings have a span of 82 feet and a surface of 1,300 sq. ft. It is equipped with 3 Issotta-Fraschini engines, each developing 260 H.P. and connected to nine foot propellers. Speed 95 M.P.H. Weight about 5½ tons

FOREIGN NEWS

Allied Seaplanes Attack Bolsheviki

Klem, Northern Russia—Allied seaplanes attacked four Bolshevist craft on Lake Onega, south of here, on June 8. The bombs dropped did not hit the boat, but the machine guns carried by the aircraft raked their decks and silenced the anti-craft guns mounted there.

The Bolshevist flotilla fled and was pursued for a great distance. One allied plane returned to its base, reloaded bombs, and rejoined thet others in the pursuit. After the engagement all the allied machines returned.

Adjutant Casale Again Breaks World's Altitude Record

Paris.—Adjutant Casale, a French aviator has again broken the world's altitude record by ascending to a height of 31,168 feet. His previous mark, 31,012 feet was attained on May 28.

Aerial Derby Around London On June 21

London.—The aerial derby, after five years of war has been revived and will take place on June 21.

The race is to start and finish at the Hendon Aerodrome, and all London will have the opportunity of witnessing the spectacle of twenty to thirty high-speed aeroplanes racing around the suburbs of the metropolis and will be able to realize the remarkable progress made in flying machines since the race was first held in 1912, when T. Sopwith was the winner in a 70 H.P. Bleriot monoplane, his average speed being fifty-nine miles an hour.

In 1913 Gustav Hamel in an 80 H.P. Morane monoplane won at a speed of seventy-six miles an hour, and the winner of the 1914 contest was W. L. Brock, an American airman, in an 80 H.P. Morane monoplane, his speed being seventy-two miles an hour.

It is expected that the speed of the winner of this year's contest will exceed 150 miles an hour. The three entries already announced include an American pilot, Clifford B. Brodger, who will fly a B.A.T. scout, with a ABC engine.

King Albert Uses Aerial Transport Between European Capitals

London, Eng.—King Albert of Belgium is using the aeroplane almost exclusively in the travels between the European capitals. On May 15 he arrived at Hawkinge Aerodrome,, near Folkestone from Brussels. On the following day he flew from Folkestone to Gosport in a DH-9 machine, from whence he continued his flight in a F. 2A flying boat to Dartmouth in order to visit his son at the Royal Naval College. The return to Dover was made a few days later, from whence he returned to Brussels on one of the Folkestone-Cologne aerial mail service planes.

F. A. I. Excludes Germans

Paris.—At the first meeting of the Federation Aeronautique Internationale since the opening of the war was held at Paris at the Aero Club de France with representatives of France, Great Britain, Italy, Belgium, Norway, Holland, Sweden, Switzerland and the United States were represented. It was unanimously resolved that Germany, Austria and Hungary should be excluded from the Federation as long as they are not admitted to the League of Nations.

F-5 Seaplane and Handley Page Make Endurance Flights

London.—A stock F-5 seaplane fitted with two 350 horsepower Eagle VIII Rolls-Royce motors made an endurance flight of 14½ hours. The course followed was a coastel one, passing Margate, Eastbourne, Bognor, Brighton, Folkestone, Ramsgate, Sheerness, Cromer, Southwold, Lowestoft and back to Felixstowe, with which radio communication was maintained throughout the entire flight.

Another very satisfactory endurance flight was carried out recently from a Royal Air Force aerodrome in Norfolk by a four-engined (Rolls-Royce) V/1500 Handley Page service machine. Carrying a crew of five officers and three other ranks, the machine left the aerodrome at a few minutes before eight in the morning and did not land again until twenty minutes to eight at night, completing 11 hours, 33 minutes in flight.

The total distance flown over the ground was 836 miles, corresponding to a mean speed of 72.8 miles per hour, with a load of 24,890 lbs. all on.

In the course of the flight, Birmingham, Southport, Manchester, Lincoln, London, Felixstowe, Yarmouth, and Hunstanton were visited.

1,100 Miles Over Desert in One Day

Lieut.-Colonel Wilson, of the British Staff in Mesopotamia, has made a new record in flying from Mosul to England in a week. He was mounted on a D. H. 9A machine, and crossed the desert from Mosul to Cairo in one day, making three stops on the trip of 1,100 miles.

Commercial Aeronautics in Western Canada

Edmonton, May 17.—Aviation as a commercial enterprise will be tried out in Edmonton this summer, according to Court May, managing director of May Aeroplanes, Limited, a company which was incorporated recently with a capital of $20,000. The company will commence operations this summer.

Aero Club of Calgary Presented With Aeroplane

Charles W. Diffin, who is in Canada on business and who was chairman of the International Aircraft Standards Board, announced recently that he was prepared to make a sporting offer to the Aero Club of Calgary which, if accepted, would result in three or four machines being seen in the air here within six weeks. The planes are of the Curtiss JN-4 type, and are capable of attaining a speed of 75 miles an hour.

Fonck Flies Up 30,000 Feet

Issy les Moulineaux, France, June 4.—Capt. Rene Fonck, the famous French ace, attempted this morning to break the altitude record in an aeroplane of 31,000 feet made by Adjt. Casale May 28. The aviator rapidly ascended until he had attained a height of 30,000 feet. Here, however, his motor froze and he was forced to make a thrilling volplane with his engine stopped.

Portuguese Government Offers $30,000 Prize for Portugal-Brazil Flight

Lisbon, June 6. (Associated Press.)—The Portuguese Government today issued a decree establishing a prize of 30 contos (at normal exchange approximately $32,400) for the Portuguese or Brazilian aviator who flies from Portugual to Brazil.

The Minister of Marine, in discussing the offer of a prize, said that Portugal had been stimulated by the example of the United States and intends to establish a commercial aviation route between Portugal and Brazil. The route would be from Lisbon, Madeira, the Canary Islands, Fernando Noronlia, and Pernambuco, a distance of 5,400 miles.

Fiat Co. Building Biplane for Trans-Atlantic Flight

Announcement is made by the Fiat Company of Turin, Italy, that it is preparing a machine for a flight across the Atlantic without the aid of patrolling seamships. The designers claim that they can make this flight of practically 2,000 miles in fourteen hours.

The machine now being built for the flight across the Atlantic is a large biplane, the fuselage of which is an all metal construction divided into water-tight compartments and used to carry 660 gallons of fuel. In case of a forced descent on the water this fuselage can be instantly emptied of its contents and will form a float capable of supporting the pilot and observer for a considerable length of time.

The Fiat biplane will be fitted with a single twelve cylinder engine of 700 horse-power, officially known as Type A-14.

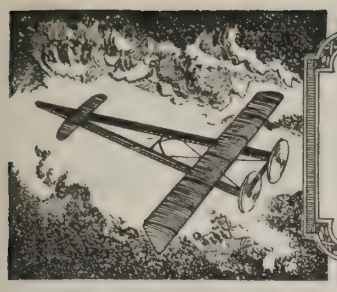
Engineer Rosatelli, who is responsible for the design of the Fiat transatlantic machine, has tackled the problem on entirely original lines. He is of the opinion that success can only be obtained by a combination of high speed and high load carrying capacity. To accomplish the trip from the New to the Old World in the time limit imposed an average speed of 145 miles an hour must be maintained. This exceptionally high speed can be attained even with the large amount of fuel necessary for such a long journey.

By reducing the time limit in this way two possible sources of failure, namely changes in the weather and possible stoppage of the engine, will be considerably reduced.

Special study has been devoted to the problem of plotting out position while crossing the Atlantic and while flying at a speed of 150 miles an hour. Such satisfactory results have been obtained in this connection that the Fiat engineers and the pilot of the aeroplane are determined to start without any assistance from ships placed along the line of flight.

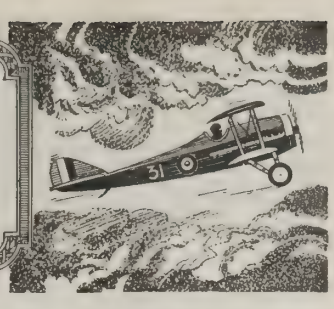


Fiat-motored S. I. A. bombing and reconnaissance machine. The S. I. A. Company is a subsidiary of the Fiat Company



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W.
Washington, D. C.
AERO SCIENCE CLUB OF AMERICA
Beach Bldg. E. 23rd St., N. Y. City
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

Contest for Aerial Age Prizes

Returns are coming in for the AERIAL AGE *contest*, and from the results new records are going to be established. The distance contests returns are now around the 1,000-foot mark and with prospects that they will be much higher when the final roll is called. Such clubs as the Aero Science, the Illinois Model Aero Club, and the Pacific Coast Model Aero Club have not yet sent in their reports. It is expected when they are received new world records will be established.

Most clubs are holding elimination contests to decide who will be in the final contests, which is good practice where there are a good many members. They will no doubt hold their final contest the last week in June.

The competition for construction is also well contested and the photographs received are worthy of exhibition without considering the models. From what we have received so far it looks as though others who wish to be considered as "up with the leaders" will have to work like beavers, for the workmanship displayed is far above the ordinary.

Whether you are lucky enough to win this prize or not, you will be well repaid for your work, as your model will have a certain value in itself. In many cases it can be used as a show window attraction and rented to different shopkeepers. We would like to receive as many returns for the flying contests and photos for the construction contest as possible so as to prevent all the returns coming in at the last moment.

Remember that all returns and records must be signed and witnessed by at least three influential citizens of your town, and the construction entry must be accompanied by a photograph and a full description of the model.

A New Flying Model on the Market

In England before the war many firms manufactured and sold models to the model fliers, who entered and flew them in contests for prizes. These models were always made from a copy of some record holder or were manufactured by some champion aeromodelist and the purchasers would feel that they had made a good bargain.

It seems that America is following in the footsteps of our cousins the English, as one of our latest formed companies, "The Flying Model Airplane Corporation," has placed on sale a full line of real racing flying models of championship form and workmanship, and the large-size racing model is shown in the accompanying photograph.

These models were designed and patented by Mr. Louis L. Kaess and Armour Selley. Mr. Kaess has been building aeroplanes since 1911, his latest production being the well-known Continental pusher which proved to be the most successful pusher type machine turned out during the war. A description of this machine may be found in the December 31, 1917, issue of AERIAL AGE. He has also built many types of training and scout machines.

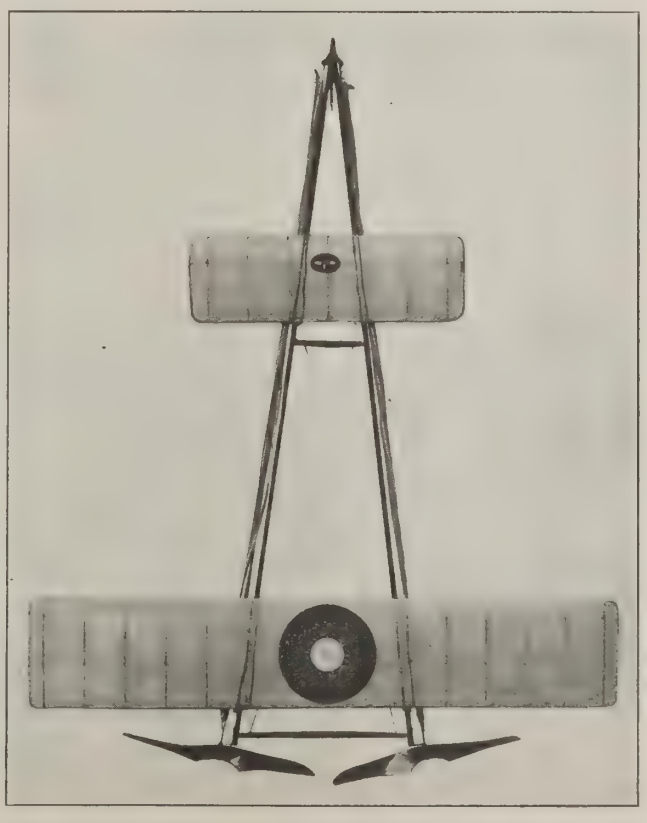
Armour Selley is well known in the model game. His former records, recognized throughout the world, stamp him as one of America's most successful model fliers. He has won six world records for model flying and during the war held a position with the Government as inspector of aircraft and was stationed at one of the largest and most important aeroplane factories. Mr. Selley's workmanship can be detected in the model shown in the picture, and this is sufficient assurance that the model is a record breaker in the hands of any intelligent boy.

The "Flying Model Airplane Corporation" is distributing these models to the different department and toy stores in each city, and they are sold for a reasonable amount.

The general dimensions are as follows:

Main wing spread	24"
Main wing curve	R.A.F. No. 6
Main wing chord	4 9/16"
Elevator wing spread	11"
Elevator wing chord	3 9/16"
Propeller diameter	8"
Propeller pitch	14"
Propeller thrust	4¼ ounces
Propeller speed	1000 R.P.M.

Power consists of ten twisted para rubber strands to each propeller and the rubber is 1/16 x ⅛ inch in cross section.



Plan view of the type F-3 monoplane built by the Flying Model Airplane Corp.



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Oh! the Deuce!

A team playing the local vaudeville houses chatters as follows:

"I see by the papers that the King and Queen of Belgium recently travelled to Paris in an aeroplane."

"So? (now here's where we come in) they must have had an Ace; that's the only thing to take a King and Queen."

Drafting Room Definitions

1. A drafting room is a place where the time between arguments is spent in making changes.
2. A tracer is a human being, who, knowing nothing himself or herself, never understands what the draftsman thinks he or she knows.
3. A designer is a bunch of erroneous ideas surrounded by the boss.
4. A data book is a collection of information nobody uses.
5. Tracing cloth is made to take the high spots of ink erasers.
6. A blue print boy is a skunk with a dirty face who smokes cigarettes, watches the clock, and sometimes makes a print.
7. A checker is a pessimist with a blue pencil, chronic indigestion, and no conscience; who spends his time trying to figure out the other way of doing everything.
8. The whistler is a form of the seven-year itch in its most aggravating form.
9. The chief is a lucky dog, who holds his job by taking credit for the ideas of his designer.

Take That

After a London air raid, a prisoner was charged with stealing a cover off a motor car.

"Have you anything to say in defense of your action?" asked the magistrate.

"Yes, sir," was the reply. "On the motor was a large notice wot said: 'Take cover,' so I just took it."—*Aircraft Rag.*

Grammatical Note

"King Flies From Brussels to Paris," says headline over account of Belgian ruler's trip. "King flees" is the more common phrase regarding movements of monarchs these days.—From N. Y. *Herald.*

From Any Pilot

Le Pere
Who art in Hangar 7,
Hallowed by thy paint;
Thy prop revolves at R.P.M.
In air as it does on the Dead Line;
Give me this day
My daily jazz,
And forgive me for trespassing against those who would trespass ahead of me,
And lead me not into tail spins
But deliver me from ground loops,
For thine is the speed, power and general pep
Forever,
Amen.

Sgt. Roy Harris Russ.



Bud Fisher, in the New York World, reveals the disadvantages of being a flying instructor

AEROPLANE INSURANCE

Merchants Fire Assurance Corporation of New York

This company issues policies covering aircraft against the following risks:

1—FIRE AND TRANSPORTATION
2—COLLISION (Damage sustained to the plane itself)
3—PROPERTY DAMAGE (Damage to the property of others)

Additional coverage may be had against loss by wind storm, cyclone or tornado.

We will be glad to discuss problems concerning aeronautic insurance.

AUSTEN B. CREHORE, Manager
For two years pilot Lafayette Flying Corps. Since 1910 employed by this company.

MERCHANTS FIRE ASSURANCE CORPORATION OF NEW YORK
45 JOHN STREET, NEW YORK CITY

FIRE—AUTOMOBILE—TORNADO—EXPLOSION—RIOT AND CIVIL COMMOTION

20 NEW CURTISS J.N.4D. F.O.B. DAYTON $2,750

With Each Machine a Complete Set of Spares and Shipping Crate

We have in stock complete line of parts for both J.N.4D and Canadian Curtiss. These parts were made for the Government before the armistice was signed and all bear the United States Government Inspection Stamp.

These Parts And Supplies To Be Sold At A Sacrifice

1000 Struts	10 Gas Tanks	300 Engine Bedsills
50 Axles	10 Sets Extra Wings	10 Curtiss Radiators
50 Tail Skids	10 Sets Wing Cover	25000 ft. 5/32 19 Strand Cable
20 Propellers	50 Sets Wing Skids	5000 ft. 1/8 19 Strand Cable
20 Rudders	100 Sets Shock Absorbers	4500 ft. 3/16 19 Strand Cable
50 Ailerons	2000 ft. Shock Absorber	500 lbs. No. 10 & 12 Air Craft Wire

WING BEAMS, TURNBUCKLES, TAPE, INSTRUMENTS, DOPE, ETC.

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INDUSTRIAL DEPARTMENT

Cleveland Offers Many Inducements to Aircraft Industry

CLEVELAND'S situation on seven trunk lines, the B. & O., C. C. C. & St. L., Erie, N. Y. C., N. Y. & St. L., Pennsylvania, and W. & L. E., gives it a service second to none in reaching all points of the country, and on favorable rate adjustment Two of the six trolley lines operating from Cleveland augment the facilities by operating freight service. The city's situation on the lake affords via water routes overnight service between Cleveland and Detroit and Cleveland and Buffalo during the entire period of lake navigation. Regular sailings tri-weekly or better afford through service for freight traffic to Lake Superior ports. Cleveland can be reached over night from either the Atlantic seaboard or the Mississippi River, and one-half the population of the United States and Canada is within a radius of five hundred miles.

Cleveland, the industrial giant, owns or controls over two-thirds of all the shipping on the Great Lakes. It is the natural meeting point for Iron Ore from the upper Lakes and coal from Ohio, West Virginia and Pennsylvania fields, thus, it is no wonder that Cleveland out-ranks all other American cities in the production of steel ships, wire, wire nails, bolts, nuts, heavy machinery, vapor stoves, electric carbons, malleable castings, telescopes, printing machinery, and many other allied industries.

Cleveland has forged ahead rapidly in the manufacture of automotive products; automobiles, aeroplanes, tractors, et cetera. Aeroplanes are manufactured in Cleveland by the Glenn L. Martin Company. Motors and various kindred parts are turned out by a large number of engineering concerns on a production scale; Motor Products & Engineering Company, E. 61st Street and Curtiss Avenue; Weger Aeronautical Motor Company, 112 Hamilton Avenue; Western Machine Products Company, St. Clair and East 73d Street.

Cleveland has for many years been remarkably fortunate in having an excellent supply of high-grade labor at all times, yet without experiencing any large surplus, even in times of industrial depression. This fact may be attributed to (1) the great diversity of industrial activities, and (2) the attractive living conditions for working men.

Indicating the variety of skilled and unskilled labor available in Cleveland, here are a few of the industries in which Cleveland either leads the entire country, or takes a very high rank:

Astronomical Instruments, Automobiles, Aeroplane Parts, Bolts and Nuts, Carriage Hardware, Castings, Chemicals, Drop Forgings, Dry Batteries, Electric Carbons, Hardware, Hoisting and Conveying Machinery, Iron and Steel Products of all kinds, Knit Goods, Machinery, Metal Stampings, Oil Paints and Varnishes, Shipbuilding, Stoves, Wire, Wire Nails, Wire Fences, Wire Springs, Women's Wear.

Cleveland is the fourth city in financial importance. It is the seat of the Fourth Federal Reserve Bank, which has the third largest capital among the twelve Federal Reserve Banks.

Cleveland enjoys a temperate climate and has the lowest death rate of any of the largest cities. There are 614 miles of paved streets in Cleveland, the thoroughfares being exceptionally broad and straight. Forty-two miles of boulevards and 20 parks containing a total of 2,673 acres do much toward beautifying this flourishing city.

Cleveland is showing a remarkable growth in new factories, population, and area. The population as estimated January 1, 1919, according to the United States Census Bureau method, was 869,831.



By Courtesy of the Ernst-Eidman Co.

Aerial view of Cleveland looking toward the lakes



MARTIN BOMBER

The Bomber Performance
Demonstrates Military Supremacy

The Martin Plane is First to Fulfill
Commercial Requirements

Our Freighter and 12-Passenger
Airplane soon to be announced

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Contractors to the United States Government

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(To appear shortly under the auspices of AERIAL AGE WEEKLY)

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Meteorologists
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Aerial Surveyors
Aerodrome Managers
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And for INFORMATION CONCERNING COMMERCIAL AERONAUTICS IN ANY PART OF THE WORLD

If **YOU** hold any of the above qualifications, but have not yet registered, you are invited to communicate with the Editor (Air Service Demobilization Department) AT ONCE

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WHY "BELLANCA"?

WHY "ANZANI" ENGINE?

WHY "TWO-SEATER"?

FOR REASONS, SPECIFICATIONS AND ALL INFORMATION :—

MARYLAND PRESSED STEEL CO. (AIRCRAFT DEPT.)

HARRY E. TUDOR, Sales Manager 299 MADISON AVENUE, NEW YORK CITY

(*Continued from page* 723)

Central News as saying with regard to Captain Alcock's achievement:

"It was a magnificent and very fine feat. I am very glad Captain Alcock was able to make the flight in real fashion without warships and all that sort of thing. It is very gratifying from that point indeed."

Congratulatory messages have been sent to Alcock and Brown by King George, General Seely, General Trenchard, and General Sykes. Major Kennedy, father of Miss Kennedy, whose marriage to Brown was postponed till after the flight, said his daughter was "very delighted, almost overwhelmed."

Secretary Daniels, in a press interview, said:

"The flight across the Atlantic of Alcock and Brown in a single 'hop' not only appeals to the imagination of every one but is a tremendous demonstration of the advance of aviation since the beginning of the war and a promise of still greater development in the future. It should inspire American aviators, too, but the development of aviation in the Navy cannot go ahead if the appropriation of $15,000,000 fixed by the House is not increased in the naval appropriation bill."

General Menoher, Chief of the Air Service, United States Army, said:

"I am very glad they have succeeded. There is only one thing that can be said on such an occasion and that is 'hurrah!' It is a great achievement when a bomber can fly across the Atlantic inside of a day and a night. It shows that Hawker had the right idea. The only trouble with his flight was that he had the element of bad luck in mechanical difficulty which forced him to bring his plane down. The element of luck was with Alcock and Brown in that they did not have difficulties of that sort.

"The flight of the Vickers-Vimy machine on top of the splendid performance of the NC-4 shows that the plan for the spanning of the Atlantic by air was feasible from the start. I will cable my personal congratulations to the two British fliers."

Rear-Admiral David W. Taylor, Chief of the Bureau of Construction and Repair, said: "It was a fine attempt and a splendid achievement, and deserves congratulations from all. They took a sporting chance and won."

By an interesting coincidence—inasmuch as it was the fate of a small minority of British war aviators—both members of the crew of the Vickers-Vimy biplane were taken prisoners during stirring careers on the fighting front. It would be hard to say which had the worst time of it. Captain Alcock fell into the hands of the Turks and Lieut. Brown became the prey of the Germans.

Lieut. Arthur Whitten Brown, navigator of the Vickers-Vimy, to whose skill and careful preparation a large measure of the trans-Atlantic flight's success is due, is an American. His birthplace was Glasgow, in 1886, but his father and mother were Americans, his father having gone abroad to inaugurate the manufacture of the Westinghouse automatic engine, now carried on by Vickers, Ltd. On coming of age Lieut. Brown claimed American citizenship, still retains it, and has no intention of relinquishing allegiance to the Stars and Stripes. He is a member of the Royal Air Force.

(*Continued from page* 739)

of Air Service, Washington, D. C.

Second Lieut. Samuel McCarthy will proceed to aviation repair depot, Speedway, Indianapolis, Ind.

Second Lieut. Thomas L. Lloyd, A. S. A., will proceed to Philadelphia, Pa., for duty in connection with hospital publications, and upon completion of this duty will return to his proper station, Washington, D. C.

First Lieut. Richard E. Lloyd is announced as on duty requiring to participate regularly and frequently in aerial flights from March 21, 1918, to July 12, 1918.

Second Lieut. Russel E. Powell, is relieved from duty with the Air Service, and will report in person to the commanding officer, military hospital, Cooperstown, N. Y.

First Lieut. David R. Shearer, will proceed to Park Field, Millington, Tenn., for the purpose of discharge.

Major Leo G. Heffernan, will proceed to Miami, Fla., take station, assume command of Chapman Field.

First Lieut. Frank M. Tierney, will proceed to the aviation repair depot, Speedway, Indianapolis, Ind.

Second Lieut. Edwin Johnson, will proceed to Dayton, Ohio, and will report to the chief, Engineering Division, for duty.

Second Lieut. Leo B. Gape, will proceed to Washington, D. C., and report to the Director of Air Service.

Lieut. Col. Davenport Johnson, Jr., will proceed to Chicago, Ill., on temporary duty for the purpose of conference with the department Air Service officer, Central Department; thence to Selfridge Field, Mount Clemens, Mich., take station, assume command.

Capt. Charles W. Drew, will proceed from Walter Reed Hospital, Takoma Park, D. C., to Selfridge Field, Mount Clemens, Mich., and report upon arrival to the commanding officer for duty with the first pursuit group at Selfridge Field.

Capt. Byron H. Mills, will proceed to Kelly Field, San Antonio, Texas.

First Lieut. Karl DeV. Fastenau, will proceed to Wilbur Wright Air Service Depot, Fairfield, Ohio.

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AERIAL AGE WEEKLY

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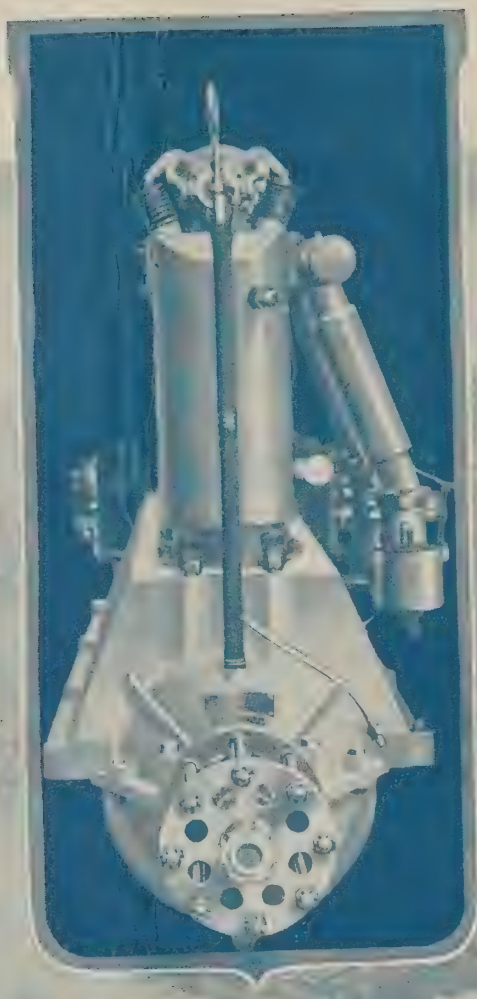


A Bristol Monoplane Flown By Lieut. Cortinez Across the Andes From Santiago, Chile, to Mendoza, Argentina, Attaining An Altitude of Nearly 20,000 Feet

Extensive Pioneer Aeroplane Tours to be Launched by Aerial League

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VOL. IX NEW YORK, JUNE 30, 1919 NO. 16

EXTENSIVE PIONEER AEROPLANE TOURS TO BE ORGANIZED BY AERIAL LEAGUE

PIONEER aeroplane tours, similar to the Glidden Automobile Tours, which did so much to bring about the use of automobiles for pleasure and transportation, are being planned by the Aerial League of America as a means of enabling those who feel the call of the air to participate in pleasure aviation events as well as to create a market for surplus military and naval aeroplanes, and aeronautic equipment.

The Aerial League, of which Rear-Admiral Robert E. Peary is president, has canvassed part of the 30,000 ex-Army and Navy reserve aviators, and the 34,000 Army cadets who were under training for the Air Service when the war ended, and has found that many are anxious to participate in such tours.

These 64,000 aviators and cadets are all college men, and besides being directly interested in aviation themselves, have parents and friends who have been anxious to make flights but could not do so because Army regulations do not permit taking civilians for flights in military aeroplanes.

From the canvass made it was found that many would like to participate in these tours for sport and pleasure; others would like to participate as a means of continuing their aeronautic activities and remain connected with the aeronautic movement, so as to be ready for whatever business opportunities the development of aeronautics may bring; others are interested for technical and scientific reasons, and see in these tours an opportunity of obtaining actual data regarding the cost of operation of aeroplanes for sport as well as for transportation, and of determining the financial basis of aerial transportation; others are interested because it is a pioneer movement which will do much towards bringing about the use of aeroplanes for general purposes and therefore should be supported.

Use of Surplus Military and Naval Aeroplanes and Equipment Will Bring Pioneer Aeroplane Tours Within Means of Hundreds

The use of surplus military and naval aeroplanes and aeronautic equipment, which can be had at low cost, will bring the pioneer aeroplane tours within the means of hundreds of people interested in aeronautics for the reasons given above.

The Pioneer Aeroplane Tours will create a market for surplus military and naval aeronautic equipment.

The Army has thousands of aeroplanes and motors, and spare parts, instruments, accessories and materials for thousands more. The Navy has over one thousand aeroplanes stored away, hundreds of which will deteriorate unless used, and, according to Washington reports, are to be sold.

The Army has already sold over two thousand of the idle aeroplanes and close to five thousand motors, which are being put on the market at prices comparing favorably with the price of the average automobile.

Aeroplanes Can Be Rented for Tours

To assist this project, the Curtiss Aeroplane & Motor Corporation is putting into effect a plan which will enable aerial tourists to rent an aeroplane for one, two or three months, and participate in the Pioneer Aeroplane Tours at a cost of less than two thousand dollars ($2,000) for two people, including the cost of the insurance for the aeroplane, the pilot and the passenger.

Will Establish Municipal Aviation Fields Throughout the Country

Landing places are to the aeroplane what good roads are to the automobile. To bring about the use of aeroplanes for general purposes it will be necessary to establish flying fields throughout the country, as near to the cities as possible, to facilitate air travel.

Hundreds of cities all over the United States have applied to the Aerial League of America for assistance and advice in establishing municipal flying fields, and are ready to establish them.

The Pioneer Aeroplane Tours will give the necessary incentive to bring prompt action in establishing these fields, and whereas the aerial tours are to extend throughout the United States and will include seaplane tours also, it is expected that in a short time there will be a sufficient number of flying fields for aeroplanes, and seaplane stations for seaplanes, to permit the employment of aircraft for transportation and general purposes.

Plans for the Aerial League of America's Pioneer Aeroplane Tours

(1) The Aerial League of America's Pioneer Aeroplane Tours, which are on the plan of the famous Glidden Automobile Tours, are to start this summer and continue weekly throughout the year, extending South as cold weather comes.

(2) The tours start with aeroplanes of "economic" type, such as aeroplanes equipped with motors from 90 horsepower up, of which the Government has thousands for sale.

(3) Every effort will be made to create a market for the surplus Army and Navy aeroplanes, motors, accessories and aeronautic materials.

(4) When it becomes feasible, larger aeroplanes will be admitted. Then it may be well to have different classes of entrants, allowing 50 horsepower additional for every extra passenger carried. In other words, if the maximum horsepower allowed for two people is 150 horsepower, then a 200-horsepower machine must carry not less than three people and a 250-horsepower machine must carry not less than four people, a 300-horsepower machine must carry not less than five people, and so on, allowing 50 horsepower for every additional passenger.

(5) Seaplane tours or cruises will be started as soon as possible.

(6) To begin with, the tours will be divided into four classes, as follows:

(a) One-day tours, for people who can only spend one day a week.

(b) Week-end tours, which will last from Friday to Sunday or Monday, for people who can only spend their week-end.

(c) "Vacation week tours," which will last one week, for people who wish to spend a week of their vacation in aerial touring.

(d) Three-thousand-mile tours, which will last ten days, for people who wish to spend two weeks of their vacation in aeroplane touring.

(7) One of the aims of the tours will be to open airways for air travel, and establish supply stations throughout the country for air travelers.

(8) The average travel for one day in these aerial tours will be 250 miles, which is less than four hours in the air, so as to afford plenty of time each day for the aerial tourists to "take in" other diversions, such as tennis, golf, swimming, motoring, riding, etc., wherever they stop.

(9) Expert mechanics, spare parts, fuel and supplies will be provided at the stopping places, where necessary repairs will be made, tanks filled and aeroplanes attended to at the lowest possible charge.

(10) Headquarters for these tours have been established in New York and at Atlantic City, at the Atlantic City Airport, which, being the civilian aeronautic center of the United States, and being ideally located geographically, will become the starting place and terminus for the tours.

Headquarters for the tours will also be established in all the cities selected as the stopping places.

(11) These aeroplane tours will be led by squadron commanders, who will lead the touring planes in squadron formation in all the tours.

(12) Entries can be made by individual owners, aero clubs, newspapers, States, cities, chambers of commerce, rotary clubs, colleges, automobile clubs and other organizations, and by manufacturers. The entries must be addressed to the Chairman, Aerial League of America Touring Committee, Atlantic City Airport, Atlantic City, N. J.

Tentative Routes for the Aerial League of America's Pioneer Aeroplane Tours

250 Miles Tour to Last One or Two Days

In this tour the aviators will start from Atlantic City Airport, in formation, follow the coast, land at either Sea Girt or at Asbury Park or Keyport for gasoline, continue to New York, land on the New York Police Aviation Landing Place at Seventy-ninth Street, near Columbia Yacht Club, have lunch and fill the tanks. The New York stop may be made at Garden City and the aerial tourists may participate in sporting events being held there.

From New York follow air route over Elizabeth, New Brunswick, Princeton, Trenton; land at Philadelphia.

Start from Philadelphia and either fly straight to Atlantic City or to Wilmington, and return to Atlantic City.

On this route there are landing places practically everywhere, from thirty to fifty miles apart.

500 Miles Tour to Last Two or Three Days

In this tour the aviators will start from Atlantic City Airport, in formation, follow the coast, land at either Sea Girt or at Asbury Park or Keyport for gasoline, continue to New York, land on the New York Police Aviation Landing Place at Seventy-ninth Street, near Columbia Yacht Club, have lunch and fill the tanks. The New York stop may be made at Garden city and the aerial tourists may participate in sporting events being held there.

From New York follow air route over Elizabeth, New Brunswick, Princeton, Trenton; land at Philadelphia.

Stop overnight at Philadelphia. Start from Philadelphia in the morning, fly to Wilmington, then to Havre-de-Grace, then to Baltimore for lunch.

After lunch proceed to Washington (land at Bolling Field or College Park), and either stay at Washington overnight or fly back to Atlantic City by way of Annapolis and Dover.

750 Miles Tour to Last Three or Four Days

In this tour the aviators will start from Atlantic City Airport, in formation, follow the coast, land at either Sea Girt, or Asbury Park or Keyport for gasoline, continue to New York, land on the New York Police Aviation Landing Place at Seventy-ninth Street, near Columbia Yacht Club, have lunch and fill the tanks. The New York stop may be made at Garden City and the aerial tourists may participate in sporting events being held there.

From New York follow air route over Elizabeth, New Brunswick, Princeton, Trenton; land at Philadelphia.

Stop overnight at Philadelphia. Start from Philadelphia in the morning, fly to Wilmington, then to Havre-de-Grace, then to Baltimore for lunch.

After lunch proceed to Washington (landing at Bolling Field or at College Park).

From Washington proceed to Richmond by way of Fredericksburg, and from there to Newport News and back by following coast line, and making a landing at Cape Charles or Cape May.

1000-Mile Tour to Last From Four to Six Days

In this tour the aviators will start from Atlantic City Airport, in formation, follow the coast, land at either Sea Girt or Asbury Park or Keyport for gasoline, continue to New York, land on the New York Police Aviation Landing Place at Seventy-ninth Street, near Columbia Yacht Club, have lunch and fill the tanks. The New York stop may be made at Garden City and the aerial tourists may participate in sporting events being held there.

From New York proceed to Albany (landing on Municipal Flying Field); then proceed to Binghamton, thence to Ithaca, Rochester, Batavia, Erie, Cleveland, Pittsburgh, Uniontown, Cumberland, Brockton, Lancaster, Hagerstown, Washington, D. C.; Baltimore, Wilmington, Middletown, Mays Landing, Atlantic City Airport.

1,500-Mile Tour to Last From Six to Ten Days

In this tour the aviators will start from Atlantic City Airport, in formation, follow the coast, land at either Sea Girt, or Asbury Park or Keyport for gasoline, continue to New York, land on the New York Police Aviation Landing Place at Seventy-ninth Street, near Columbia Yacht Club, have lunch and fill the tanks. The New York stop may be made at Garden City and the aerial tourists may participate in sporting events being held there.

From New York proceed to Albany (landing on Municipal Flying Field); then proceed to Binghamton, thence to Ithaca, Rochester, Batavia, Buffalo, Brockton, Erie, Cleveland.

From Cleveland proceed to Toledo, Lima, Piqua, Dayton, Springfield, Columbus, Zanesville, Wheeling, Uniontown, Cumberland, Hagerstown, Lancaster, Washington, D. C.; Baltimore, Wilmington, Atlantic City Airport.

2000-Mile Tour to Last From Eight to Ten Days

In this tour the aviators will start from Atlantic City Airport, in formation, follow the coast, land at either Sea Girt, or Asbury Park or Keyport for gasoline, continue to New York, land on the New York Police Aviation Landing Place at Seventy-ninth Street, near Columbia Yacht Club, have lunch and fill the tanks. The New York stop may be made at Garden City and the aerial tourists may participate in sporting events being held there.

From New York proceed to Albany (landing on Municipal Flying Field); then proceed to Binghamton, thence to Ithaca, Rochester, Batavia, Buffalo, Erie, Brockton, Cleveland.

From Cleveland proceed to Sandusky, Toledo, Lima, Piqua, Dayton, Springfield, Columbus, Zanesville, Wheeling, Uniontown, Cumberland, Hagerstown, Washington.

From Washington proceed to Fredericksburg, Richmond, Newport News and back to Atlantic City, following the coast line, stopping at Cape Charles, New Church, Cape May, or by other cities inland.

2500-Mile Tour to Last From Eight to Twelve Days

In this tour the aviators will start from Atlantic City Airport, in formation, follow the coast, land at either Sea Girt, or Asbury Park or Keyport for gasoline, continue to New York, land on the New York Police Aviation Landing Place at Seventy-ninth Street, near Columbia Yacht Club, have lunch and fill the tanks. The New York stop may be made at Garden City and the aerial tourists may participate in sporting events being held there.

From New York proceed to Albany (landing on Municipal Flying Field); then proceed to Binghamton, thence to Ithaca, Rochester, Batavia, Buffalo, Erie, Brockton, Cleveland.

From Cleveland proceed to Sandusky, Toledo, Detroit, Hudson, South Bend, Terre Haute, Chicago. Then return by way of Joliet, La Salle, Peoria, Springfield, Ill.; St. Louis. From St. Louis to Effingham, Terre Haute, Indianapolis.

From Indianapolis to Dayton, Columbus, Wheeling, Uniontown, Cumberland, Hagerstown, Washington, D. C.; Baltimore, Wilmington, Philadelphia, Atlantic City.

3000-Mile Tour to Last From Twelve to Fifteen Days

In this tour the aviators will start from Atlantic City Airport, in formation, follow the coast, land at either Sea Girt, or Asbury Park or Keyport for gasoline, continue to New York, land on the New York Police Aviation Landing Place at Seventy-ninth Street, near Columbia Yacht Club, have lunch and fill the tanks. The New York stop may be made at Garden City and the aerial tourists may participate in sporting events being held there.

From New York proceed to Albany (landing on Municipal Flying Field); then proceed to Binghamton, thence to Ithaca, Rochester, Batavia, Buffalo, Erie, Brockton, Cleveland.

From Cleveland proceed to Sandusky, Toledo, Detroit, Hudson, South Bend, Chicago. From Chicago to Joliet, La Salle, Peoria, Springfield, Ill.; St. Louis. From St. Louis to Sparta, Ill.; Dexter, Millington, Tenn.; West Point, Miss.; Montgomery, Ala.; Americus, Ga.; Macon, Ga.; Augusta, Ga.; Columbia, S. C.; Pinehurst, N. C.; Raleigh, N. C.; Richmond, Va.; Fredericksburg, Va.; Washington, D. C.; Wilmington, Del.; Philadelphia, Pa.; Atlantic City.

While this route is most extensive, every place mentioned on this route, from St. Louis to Tennessee, Missouri, Alabama, Georgia, North Carolina, South Carolina and Virginia, has been used as a landing place by U. S. Army aviators, and is known to have a suitable landing field.



The News of the Week



Aviators of All Nations Eligible for $50,000 Trans-Pacific Flight

Los Angeles.—Licensed aviators of any nationality may compete in the proposed transpacific aeroplane flight for which Thomas H. Ince has offered a prize of $50,000 according to rules governing the contest made public recently. The flight may be attempted from either side of the Pacific, but if made westward Venice, Cal., must be the starting point and the landing made on the mainland of Australia, the Japanese Islands, or the continent of Asia. If made eastward, Asia, Australia, or Japan may be the starting point and the finish made on the mainland of the United States.

The contest will be open from next September to February, 1920. The flight must be completed within 12 days.

If the flight across the Pacific is not completed, Ince said, the aviator reaching the Hawaiian Islands in the shortest time would receive $10,000. If no contestant reaches the Hawaiian Islands the aviator who flies the furthest in that direction will receive $5,000.

Curtiss Triplane to Attempt Altitude Flight

Roland Rohlfs, test pilot of the Curtiss Company, will make an attempt this week to bring back to America the world's altitude record in a new Curtiss triplane known as the Wasp. The present record of 33,136 feet was made recently by the French aviator Adjutant Casale.

The wings of the machine have been specially modeled for fast climbing, and the new Curtiss "K" type of twelve-cylinder motor has been installed. The Wasp is a small machine, designed as a fighting 'plane for the Army, but was not completed until the armistice was signed.

Under official Government tests with a full military load it established the world's record in speed at 163 miles an hour. It also has established the climbing record, ascending 16,000 feet in ten minutes. The Washp is the smallest triplane in the world, measuring 32 feet across the wings. The length over all is 23 feet 3 inches, and despite the three wings she is but 9 feet 10½ inches high.

Cascade Mountains Crossed by Curtiss Biplane

Cle-Elum, Wash.—Lieut. Jay M. Felters, with Private Edward Kessel as passenger, crossed the Cascades from Seattle to this place at an altitude of 9,000 feet, covering the distance of 95 miles in 70 minutes. This is the first crossing of the Cascades from Seattle.



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Captain Roy N. Francis standing in front of the Martin bomber, which he will pilot across the continent

New York City Will Establish Landing Field

New York City.—At the request of Major Gen. Charles T. Menoher, Chief of the Air Service of the United States Army, New York City may construct a municipal landing field for commercial, mail and military aeroplanes. This developed recently at the meeting of the Board of Estimate, when Comptroller Charles L. Craig laid before the board a letter from General Menoher regarding the proposed field.

According to the communication from General Menoher, the Government has adopted a general policy to further the project. The General predicts that the development of aviation in the United States will be along both military and commercial lines. He states that the Post Office Department now finds it necessary to establish throughout the country terminal or way stations for its aerial mail deliveries, and joins with the Air Service in presenting the project to the attention of the city of New York.

According to the communication from the Director of Air Service, should the city of New York decide to co-operate with the Government in establishing landing fields, the army will obligate itself to furnish an expeditionary hangar to be erected on the field at the expense of the city. The army will request that the city bear the expense necessary for the establishment of the landing field, and the maintenance of both the field and the equipment, exclusive of aeroplanes.

The matter was referred to the Finance and Budget Committee.

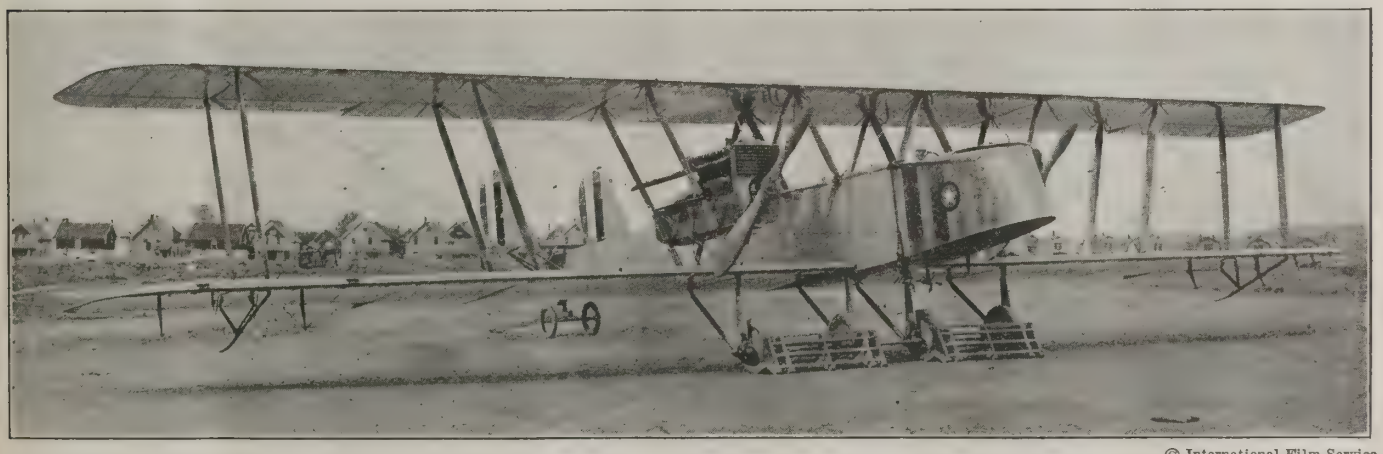
The Queens Chamber of Commerce is fighting hard for the establishment of the municipal landing field within that borough. A field located there, according to the manufacturers, would not have the same advantages as one in Central Park, owing to the extra time taken to get to the heart of the city.

By draining the reservoir in Central Park, they assert, the present facilities for the public would not be interfered with. It would have the advantage of being free from trees, telegraph and power lines, tall buildings and other things that might make landing dangerous. There would also be ample room for the machines to take off.

Admiral Benson Urges Naval Aircraft Development

New York, N. Y.—Returning aboard the battleship Arkansas, Admiral William S. Benson, naval advisor to the American Commission for Negotiating Peace, and chief of operations of the Navy, urged the concentration of time and energy to the development of naval aircraft. The future of aeronautics in naval warfare requires that this arm of the service be extensively developed and that continuous research and development be continued.

"The thing that particularly interests me," said Admiral Benson, "is naval aviation. The Navy will devote much time and money to experiments in this field in the future, but there will be no daring attempts. We must rely on scientific data and the steady progress that they will give."



© International Film Service

The Martin bomber, which will be used for the trans-continental flight. It is powered by two Liberty motors



The 30-Passenger Caproni Triplane

WINGS have a total span of 96'-10". Overall length 49'-2". Height 24'-6". Wing Chord, 9'-1" and gap between planes, 8'-9". The wing area is 2,600 square feet. Weight, empty, about 14,000 pounds. Weight, loaded, about 25,000 pounds.

There are five Isotta Fraschini V 6 Type, 6 cylinder, 260 H.P. engines; the two inner engines at the nose of fuselage are placed in tractor position. Beyond each fuselage a streamlined nacelle is placed at either side below the middle wing with engines driving pusher propellers. The fifth engine is placed at the middle of the machine in the after part of the passengers' compartment and it drives a pusher propeller. The speed is about 105 miles an hour.

The passengers are seated side-by-side on the upper deck. The lower deck contains, besides accommodations for 22 passengers, a toilet room and a small car where drinks, sandwiches, etc., are served. The passenger compartment (room for 8 persons) on the upper deck, is used as a smoking-room.

The machine is designed for five engines of 400 H.P. each, and it can be equipped with Liberty "12's" or Eagle Rolls-Royce. Pending the installation of these engines, the machine is flying with the Isotta Fraschini engines.

Read and Towers to Be Greeted By Aero Club of America

New York, N. Y.—Arrangements for the reception of Commander John H. Towers, commander of the trans-Atlantic flying boat squadron, Lieutenant Commander Albert C. Read, commander of the successful NC-4, and Lieutenant Commanders Little and Richardson are being completed by a committee of the Aero Club of America. Commander Towers and his companions sailed from Brest aboard the American transport Zeppelin and are due to arrive on June 26.

The Aero Club of America announced the appointment of a representative committee of officers and members to take part in receiving the trans-Atlantic aviators. It comprises President Alan R. Hawley, Secretary Augustus Post, Rear Admiral Bradley A. Fiske (retired), Commissioner Murray Hulbert, Capt. Robert A. Bartlett, the Arctic explorer; C. J. Edwards, C. H. Harley, Mayor of Astoria, Wash.; Lieuts. W. B. Peabody, J. D. Hill, C. H. Payne, C. T. Kuhl, J. W. N. Richardson and Ensign J. M. Corbett. Several members have signified their intention of joining in the club's welcome.

As soon as arrangements can be made the Aero Club will tender a dinner to the commanders and crews of the NC-1, 3 and 4. The invitation was extended while the aviators were at Paris, and a wireless reply from Commander Read said their first duty would be to report to Secretary Daniels, and that arrangements for the dinner should be made through the Navy Department. A date will be fixed as soon as possible.

Aerial Patrol Ordered for Mexican Border

Washington.—Three aeroplane units of six machines each have been ordered by Director of Air Service Menoher to leave Kelly and Ellington fields, Texas, immediately to conduct observation work along the Mexican border.

Guardian Angel Parachute Tested at Atlantic City Airport

Atlantic City.—The "Guardian Angel" parachute, officially adopted by the British Royal Air Force as the most certain aerial life preserver yet invented, was demonstrated at the Atlantic City Airport on June 19 by Major Ordo Loos, R. A. F., and Miss Sylvia Boyden, of England.

They ascended to a height of one thousand feet in an aeroplane piloted by Eddie Stinson. After circling for a moment both Major Loose and Miss Boyden dove head first from the machine.

A big crowd, including many aerial experts, saw the parachutes open without a jerk and watched the demonstrators float gently to the ground. The tests will be repeated Saturday. Among those who witnessed them were Glenn H. Curtiss, Henry Woodhouse, of the Aerial League of America; A. S. Abell, 3d, of the Aero Club of America; Lieutenant G. W. Shaw, U. S. N., and Albert T. Bell, president of the Atlantic City Aero Club.



© Central News
Plymouth's welcome to the crew of the NC-4. Lieutenant-Commander Read is passing through St. Andrew's Square

Petrova Visits Atlantic City Airport

Atlantic City, N. J.—Olga Petrova, the noted Russia dramatic star and screen artist, visited Atlantic City's Airport recently and displayed a deep interest in the various types of machines there. She took a flight with Eddie Stinson, the noted acrobatic flier, and expressed very aptly the contrast between flying in the enclosed machine of to-day as compared with her first flight in an exposed machine.

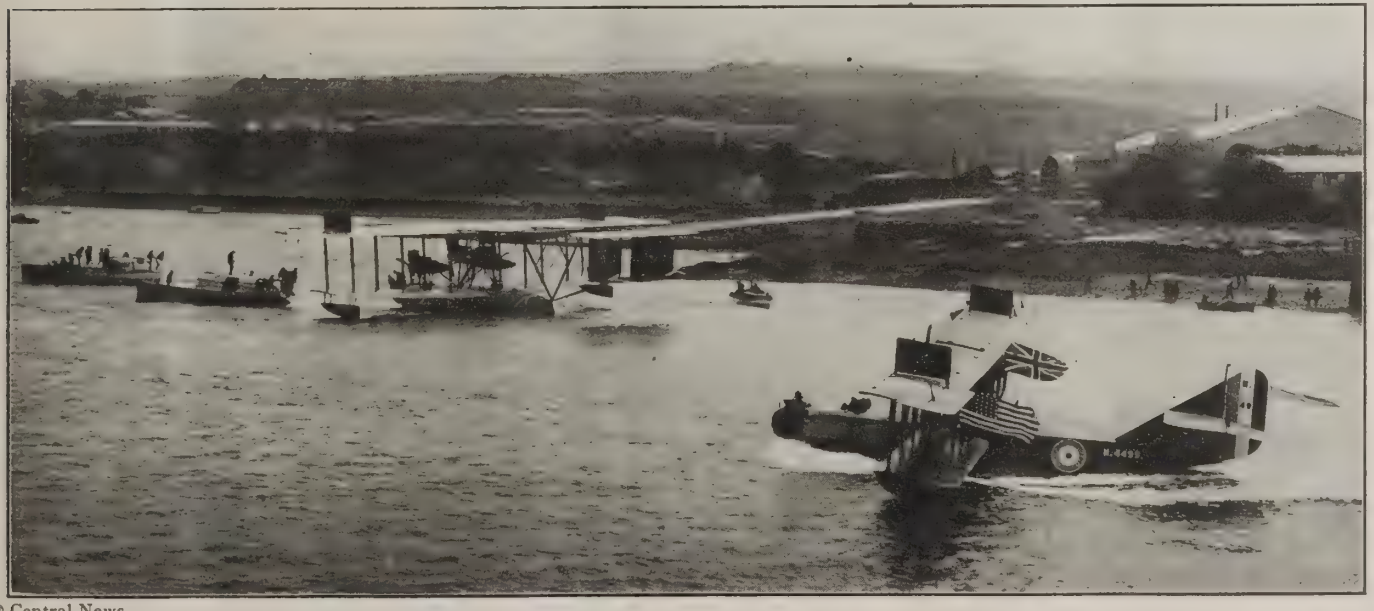
A Challenge to Parachute Manufacturers

Atlantic City.—A challenge to American makers of parachute aerial life preservers was issued to-day by Major T. Orde-Lees, the British parachute expert, who is at the Atlantic City airport, where he will demonstrate the British parachute known as the "Guardian Angel." The challenge is issued to prove by competition the superiority of the "Guardian Angel" parachute as a life preserver for aviators and air travelers.

Major Orde-Lees gives the selection of Monday, June 23rd, and Thursday, June 26th, for the competitions.

The challenge was telegraphed by Major Orde-Lees to Lawrence Sperry, Farmingdale, Long Island; Lieut. Jean Ors, the French parachute expert, who has been demonstrating his unique device at the Atlantic City airport; W. L. Watkins, who also displayed his 'chute at the local field, and the Irving Airchute Co., 523 Main St., Buffalo, N. Y.

The public and the aeronautic and military and naval authorities have been invited to witness the demonstrations.



© Central News
The NC-4 floating safely on the waters at Plymouth

THE NEW CURTISS WIND TUNNEL

THE wind tunnel has been employed by the Curtiss organization as a means of verifying aeronautical design since 1908. Two tunnels of two and four foot diameters respectively had been built and used up to 1918. The four-foot tunnel is still in active service at the Curtiss Engineering Company's plant at Garden City, L. I., and the two-foot mechanism is used for qualitative experimentation as well as for exhibition purposes. Both, however, have been supplemented to a large extent by the new seven-foot tunnel which was planned in 1918 and completed early in 1919. This is believed to be the largest and most efficient device of its kind in the world.

In describing this new tunnel it will be desirable to recall certain facts about the wind tunnel in general. The chief purpose of the apparatus is, as the aeronautical reader knows, to test out the efficiency of an aeroplane or aeroplane element design before production is begun, as well as to afford a means for carrying on aeronautical research. Such a test is effected by sucking a stream of air through a tunnel or tube-like structure past a small model of the contemplated aeroplane or aeroplane element, and registering, through mechanical devices, the various effects of the air in pounds of force on the model. The air rushing by the model produces the same result as if the model were passing through the air. Effects in lift, drift and equilibrium can be accurately measured and studied. Nor is it necessary to make the test at the speed in miles per hour at which it is desired to fly the full-size aeroplane. Data obtained from a slower speed can be made the basis of prediction for any velocity contemplated.

A wind tunnel is in principle a single continuous tube, but this tube is divided into three sections. They are termed the collector, the experimental or test chamber, and the diffuser. The motor operates at the large end of the diffuser, sucking the air through the collector, experimental chamber and diffuser towards itself.

The new Curtiss tunnel is suspended on steel cables from the ceiling of a room 103 x 30 x 35 feet. The suspension device allows a perfectly free and symmetrical circulation of air back from the point at which a 400 H.P. motor with a three-bladed propeller sucks it to the horn-shaped mouth of the collector, where it is again drawn into the tunnel. This method of support, which is one of its novel features, has given excellent results.

The collector portion of the tunnel is 15 feet long. The entrance diameter is 17 feet; the diameter at the wall is 7 feet. The shape is determined mathematically. The cross section is a twenty-sided polygon. The wooden rings are constructed by placing together two ten-sided polygons and rotating one relatively to the other. This construction is exceedingly strong and rigid. The air pressure on the walls of the experimental house is about 36 pounds per square foot when the wind speed is 100 miles per hour. The air then passes through a honeycomb which produces a straight, uniform flow of air at the point where the model is supported just beyond.

Models used for this purpose must be constructed with the greatest accuracy in order that the results obtained from them may be reliable when applied to the full size aeroplane. They must be made absolutely to scale; the dimensions of the wings, struts, tail surfaces, etc., being reproduced to one-thousandth of an inch.

The effect of the air current is to produce a lift and a drag on the model, which quantities are precisely measured by moving weights along the weight arms of the balance. The only part of the balance extending into the wind stream is a rod or spindle on which the model is mounted. The correction for the effect on wind flow on this spindle is easily made.

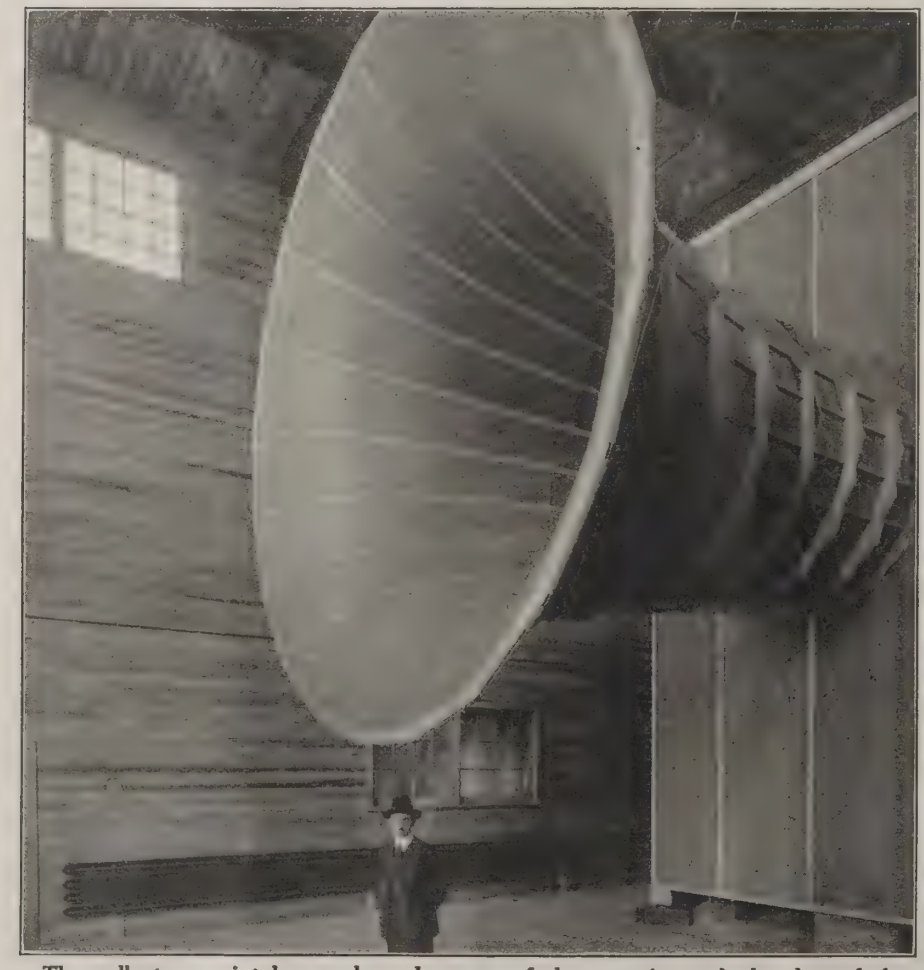
The model, sometimes as large as three feet in span, is attached to a steel vertical arm or spindle which holds it at the center of the air stream. It is at the forward end of the experimental chamber. The chamber has a length of fifteen feet and a width of thirteen. It is thus of much greater diameter than the rear end of the collector, or of the diffuser, which, starting at the front end with a diameter of eight feet, gradually enlarges until at the motor end it is twelve feet in diameter. The diffuser is thirty-seven feet long.

The four-foot tunnel is of another type —the enclosed type—in which the experimental chamber is of the same diameter as the diffuser and the small end of the collector. This, in the opinion of those who constructed the Garden City wind tunnel, has several disadvantages.

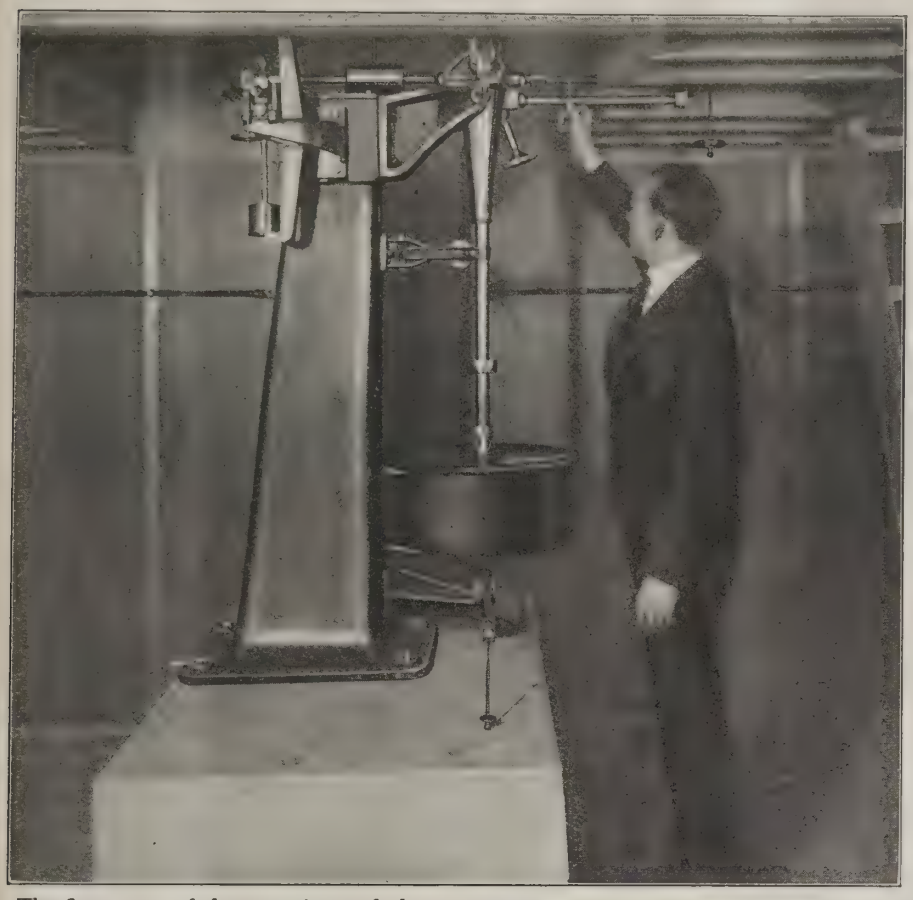
For instance, it restricts narrowly the size of the model. Every model causes some displacement of air. Displacement tends to cause an expansion of the cross-section of the air stream. With very small shapes the bad effects are negligible, but as the model grows larger it creates sufficient displacement to cause air-packing against the tunnel sides, and consequently a type of flow different from that actually obtaining in free air. In the Eiffel type of tunnel displacement can occur without this interference with the air stream. The air column keeps rather closely the form in which it leaves the collector. The diameter of its cross-section is thus approximately seven feet. Passing through a chamber whose cross-section has a diameter of thirteen feet, it has room for expansion.

Another disadvantage of the enclosed type may be noted. The air stream completely fills the tunnel. The manipulator is thus forced to stand outside. As a consequence, adjustment of the model is made so difficult that in order to effect it the motor operating the tunnel is usually shut off. In the Eiffel type, however, the manipulator stands inside the tunnel in the experimental chamber. From his place just outside the air column he can reach out and adjust the model at will.

The experimental chamber extends above and below the tunnel itself, and rests on the floor instead of being suspended by wires. It is composed of three stories. The first is below the tunnel, and contains the base of the pedestal or balance, by which the forces exerted on the model are measured. The aerodynamic balance is mounted on a concrete pedestal and the vertical arm of the balance extends thru an opening in the floor to support the model in the air stream above. A dash pot damps out the oscillations of the bal-



The collector or intake nozzle and a part of the experimental chamber of the seven-foot Curtiss Wind Tunnel. The mouth is 17 feet in diameter.



The first story of the experimental chamber in the seven-foot Curtiss Wind Tunnel, showing the uni-pivotal measuring balance, the spindle of which, projecting upward into the stream of air above, supports the model.

ance. By means of this sensitive instrument the air forces in any direction on the models are accurately measured. The rotating forces or moments on the models are also measured. The second story comprises the tunnel, into which the model projects. Air to the middle compartment of the Experimental Chamber is led through a metal honeycomb screen which serves to straighten out the air stream flowing in thru the collector just before it flows by the model. The air stream passes across the chamber as a cylinder about 7 feet in diameter at adjustable speeds controlled by the operator stationed below at the balance. The chamber is lighted electrically, and provision is made for power outlets. Direct, alternating and three-phase currents are available for propeller testing, pump testing and other experimental purposes. It also has a switch for electrical control of the motor, a Krell gauge to indicate the existing wind speeds. The third story is above the tunnel with a sliding platform from which shapes can be suspended into the air stream.

The balance used is a specially designed uni-pivot type which measures forces to less than .0001 of a pound. Air speeds up to 100 M.P.H. are now obtainable and it is expected to exceed this shortly.

The new Curtiss wind tunnel is the result of a long period of study of wind tunnel types. Data was collected on the Massachusetts Institute of Technology, Washington Navy Yard, Eiffel and other European tunnels, and an effort was made to avoid past mistakes and register an advance in scientific accuracy. The tunnel, for instance, was given a large room space, and every effort was made to get a clean and uniform return of air from diffuser to collector ends. The ideal wind tunnel would stand in free air except that free air is seldom calm. The best substitute for a calm, windless open is a large chamber in which the air supply is ample. but not subject to disturbance. Such a condition has been created for this tunnel.

In the experimental chamber of the new apparatus tests can be carried on with regard to skin friction, dirigible shapes and fuselage struts, the effect of additions to the body of an aeroplane, new wing section, propellers, gas pumps, etc., One of the most interesting works of the Curtiss staff is the sending of a standard wing section to various wind tunnel laboratories in the United States and Europe. Reports are being requested on this shape from each laboratory, and it is expected that the results will be valuable as indicating the type and degree of variations which must be expected.

The purpose of the wind tunnel being to check up on designs, it is interesting to know that there has been no recorded instance of a wind tunnel test made in one of these tunnels failing to tally with the later performance of a full-size machine.

No Curtiss model tested in miniature and pronounced satisfactory has failed to fly according to promise. The wind tunnel tests have been 100 per cent. reliable. This is a fact of high significance, indicating as it does that the aeroplane is on a thoroughly scientific basis even before the first lumber has been milled for it or the first fittings cast.

Such results are of inestimable benefit to the designers, and to the pilots who thoroughly test out the full-size machine before production and sale.



The seven-foot Curtiss Wind Tunnel, looking forward, the diffuser in the foreground, and the rim of the collector visible behind the experimental chamber to the rear.



THE WHITTEMORE-HAMM MODEL-L BIPLANES

THE Whittemore-Hamm Type "L" Aeroplanes are tractor biplanes. They are all of the same dimensions, but with different engines as follows: The L-2 has a 90 H.P. engine; L-3, 100 H.P. engine; L-4, 125 H.P. engine; and L-5, 150 H.P. engine.

The engines used are Curtiss, Hall-Scott and Hispano-Suiza.

The following specifications for the L-2 apply to the other machines in so far as dimensions are concerned.

General Specifications

Span, upper plane	36′ 4″
Span, lower plane	30′ 4″
Chord, both planes	5′ 6″
Gap, average	5′ 6″
Length overall	25′ 6″
Incidence angle	3 degrees
Dihedral, lower plane	2½ degrees
Engine, Curtiss or Hall-Scott	90 H.P.
Endurance	2½ hours
Gross load	1850 pounds
Useful load	600 pounds

Wing construction is conventional, but all hinged surfaces are fastened by fittings which make a tight connection, leaving no gap which generally exists in biplanes. There is no center section. The upper wings are connected to a pair of "A" struts over the cockpit.

The fuselage has five ash longerons running from nose to back of rear cockpit. These longerons run into a three-ply laminated wood construction, the cross section of which is egg-shape. This section is built up under pressure of hot glue, lined and covered with linen. Four spruce longerons are glued into this laminated wood part. They are attached to the forward upper ash longerons by means of steel plates. The fifth or lower longeron makes a keel which results in a deep cockpit, and at the same time permitting a reduction in head resistance.

The rear or laminated part of the fuselage has no wires in compression members, thereby doing away with all care for this part of the body.

Flaring ailerons are used on upper planes only. Operating cables from under side of top plane enter side of body at points below rear cabane struts. Dual Deperdussin wheel-control is installed.

In the interplane bracing system, both flying and landing cables are double. The overhang on upper plane is supported by streamlined steel tube braces.

The landing gear is a departure from the practice generally employed. There are six struts in all; forward struts attached to the body at lower side longerons; middle and rear struts, which are of inverted V formation, attach at the lower or "keel" longeron. Landing forces are thus transmitted to the body with advantageous distribution. The usual rubber shock-absorber elastic is used covered with a streamline aluminum housing.

The Whittemore-Hamm L-2 Biplane won a trophy and the $1,000 cash prize offered by the Boston *Globe* for the aviator making the best record in a flight between Atlantic City and Boston during the month of May.

Piloted by Melvin W. Hodgdon, the L-2 made the flight from Boston to Atlantic City in 3 hours and 29 minutes actual flying time. Full time consumed in the flight was 5 hours and 15 minutes, which included a stop of 1 hour and 16 minutes at Central Park, L. I., where extra fuel was taken aboard for the continuation of the flight.

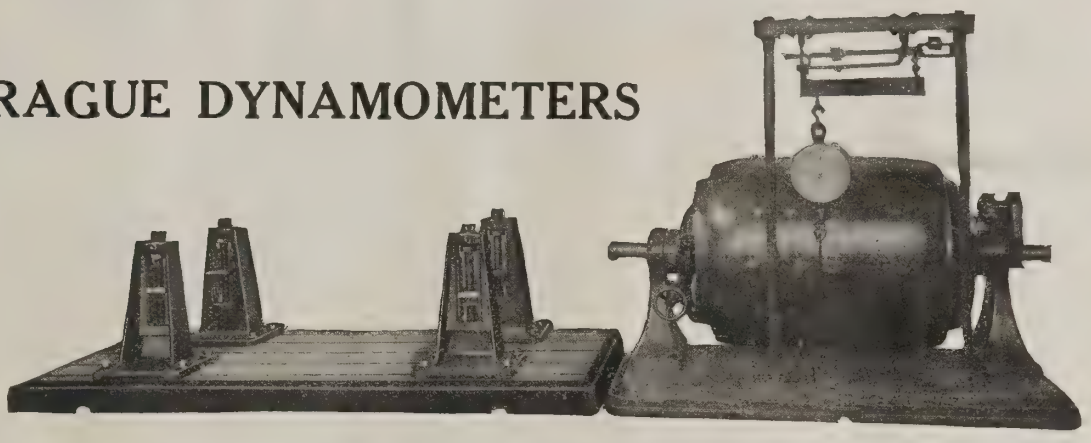
The L-2 was designed by Dr. Whittemore and his partner, Mr. Hamm. Both these men became interested in aviation as a result of the Harvard-Boston Aviation Meet at Squantum, Mass., in 1910-1911.

Hodgdon has been flying for about six years with the Whittemore-Hamm Company. During the war he was a pilot and instructor at one of the Government flying schools in the South.



A 100 H.P. Model L-2 Whittemore-Hamm Biplane used by Theodore E. Hedlund, Aviation Editor of the Boston Post

THE SPRAGUE DYNAMOMETERS



400 H.P. aeroplane engine dynamometer with engine base supports

STARTING with one installation in 1906, several hundred Sprague electric dynamometers are now in use. They have played an important part in the development of aeronautical engines and apparatus and are recognized as standard laboratory equipment for the testing of engines by manufacturers, technical schools and Government experimental stations.

The electric dynamometer is a machine for measuring torque. The engine in test is coupled to the internally revolving rotor of the dynamometer, which transmits the full torque exerted by the engine to the external field or oscillating frame by electromagnetic interaction. The oscillating field frame is balanced on ball-bearing pedestals and is restrained from revolving by the scales on which the torque is measured.

Horsepower is the product of torque and speed. Specifically for a dynamometer,

$$\text{Horsepower} = \frac{\text{R.P.M.} \times \text{lbs. pull} \times \text{torque arm in feet}}{5250}$$

By making the torque arm, or distance between the point of application of the scales and the center of the shaft, a certain length, the horsepower formula is simplified.

For the dynamometers described in this article the formulas are:

$$\text{H.P.} = \frac{\text{pounds pull on scales} \times \text{R.P.M.}}{1000}$$

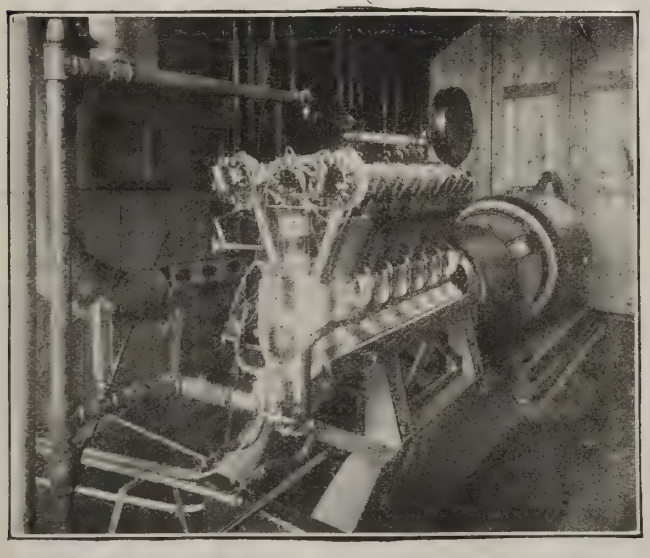
with some scale arrangements, and with others:

$$\text{H.P.} = \frac{\text{pounds pull on scales} \times \text{R.P.M.}}{3000}$$

These simple formulas can be worked out or a straight-line power-chart used.

The electric dynamometer requires a source of separate excitation for the fields at either 115 or 230 volts direct current. In special cases the dynamometer may be made self-exciting, but its speed range under these conditions is limited, and, except for production tests, separate excitation is essential. The power required for excitation of the fields is extremely small. A larger source of supply however, is required where the dynamometer is used as a motor.

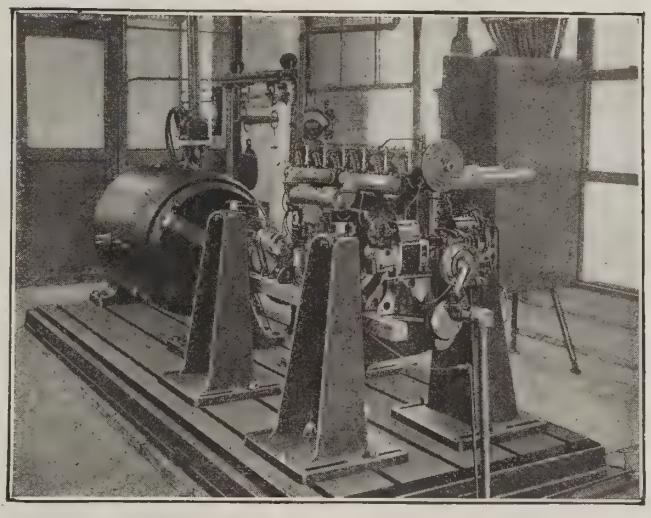
Dynamometers are built in sizes ranging from 1 H.P. to 1,000 H.P. The sizes most used range from 50 H.P. suitable for engines having a maximum torque of 50 to 200 foot pounds up to 400 H.P. machines for engines with a torque capacity of 800 to 1,600 foot pounds. In testing very large capacities two or more dynamometers can be coupled in tandem.



U. S. Liberty 12-cylinder aircraft engine in test with Sprague Electric Dynamometer

The maximum speeds range from 4,000 R.P.M. on the 50 H.P. machine to 2,500 R.P.M. on the 400 H.P. machine.

The Sprague dynamometer may be run as a transmission dynamometer for starting the engines in test, and also for measuring the friction horsepower and so determining the mechanical efficiency. For such operation the requirement is an adequate supply of direct current at either 115 or 230 volts. For friction horsepower tests the supply of direct current available should be at least 25 per cent of the maximum capacity of the engine to be tested.



A Hall-Scott engine being tested on a 200 H.P. dynamometer at the Dayton Engineering Laboratories

Dynamometers for laboratory installations, fitted with the automatic control and a wide range rheostat capacity, are capable of variation in load and speed through a range as great as can be carried by any engine within the maximum capacity of the dynamometer. Operated as a generator or brake, the speed can be controlled from practically a standstill up to a maximum of 2,500 to 4,500 R.P.M., depending upon the particular dynamometer in use, through a very great range of speed and by such fine and gradual increments that any desired speed can be obtained. If backed up with direct current power of sufficient capacity the speed range as a motor or transmission dynamometer is nearly as great.

Throughout the speed range the dynamometer can be made to resist to its full rated torque capacity, where required. In practical service the equipment is laid out for full torque capacity through an intermediate range, but by special provision in the resistor design, full torque capacity can be maintained from zero to maximum speed, with short time overload torque capacity up to the limit of the dynamometer.

As a result of this great flexibility of control, it is possible to study the performance of engines beyond their ordinary limits of load and speed, and it is possible on one dynamometer to conduct tests on a wide variety of engines, both large and small and both high speed and low speed.

THE PHYSIOLOGY OF FLYING

By W. GUY RUGGLES

Originator and Inventor of the Ruggles Orientator

THE most complex handiwork of the Creator is man. Groping mentally upward in the dawn, he early learned to articulate something that meant "why" and enlightenment has steadily followed. By force of will and mind power he has prevailed over the entire animal kingdom, constantly adding to his mental development and physical comfort through the centuries.

Essentially a land animal, the seas tempted him and he devised means for navigating that unnatural element.

Comparatively slow of travel movement, he has, ever since that fateful moment in which he conceived his first thrill of speed—perhaps on some icy slope—compelled the swifter animals, and still swifter inanimate elements of nature, to provide him with an ever-increasingly rapid means of locomotion, until with a genius and courage that almost defies practical imagination he launched himself off the earth and water and at still greater velocities is realizing another step in his progress by conquest of the air.

In all the history of the human race there is no more romantic narrative than the story of man's attempts to master the many problems involved in flying through the atmosphere, and those of us who have been interested in the dream of flight since childhood will never forget the elation we felt when the announcement was made, "The Wright Brothers Are Flying."

The progress made in the art since that momentous event is almost beyond comprehension. By directing according to his will the elements he exceeded in swiftness and strength all the creatures of the earth and sea, and he has already excelled in fleetness and power all the bird creations of the air.

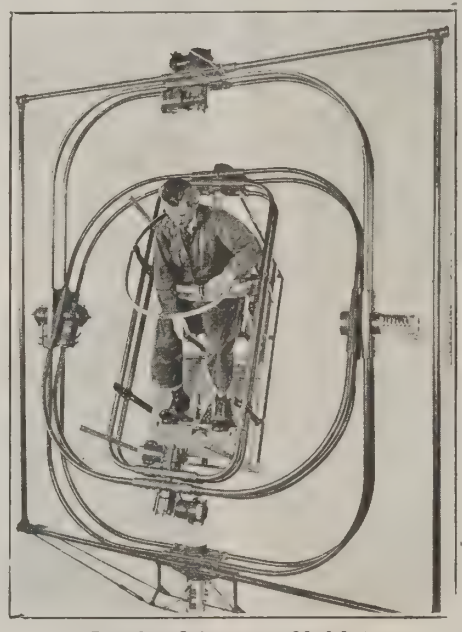
Deep indeed is the reverence we feel for the genius that made man's dream of flight into a splendid accomplishment. The man of the world has caught the spirit of the future more than we realize. Men are going to fly: the active business man to keep vital engagements—as for instance in New York, Boston and Philadelphia or Washington the same day; deliveries by air mail; others will fly entirely for recreation in order to effect the widest possible change from the business routine, and long for an hour in the clean, wide spaces of the blue sky with its expanded horizon outlook on life, and a plunge through the fleecy clouds. Be the costs or the risks what they may, the present and future generations will not be denied these opportunities.

We cannot, however, and should not if we could, forget the disasters that have cost the lives of many brave and some very skillful men while advancing the science of aviation.

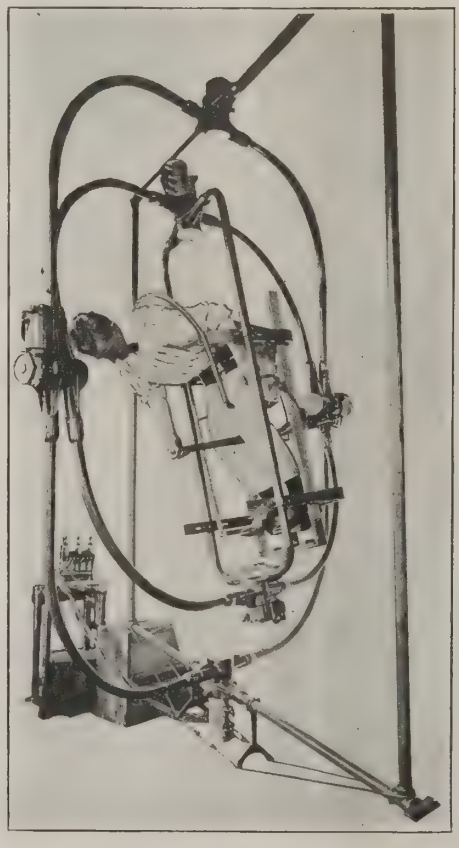
About ninety per cent of the fatal student-aviator accidents are due, a United States Army officer has stated, to mistakes or shortcomings of the man in the plane. Why does he make those mistakes; what are they? Unfortunately the man that survives a crash usually seems hazy about how it happened.

As a child, the writer had the good fortune to associate with surgeons and physicians and become interested in some of the problems and mysteries of animal life. Later when the rare privilege came of meeting and studying the performances of such men as Ely, Parmalee, Latham, Radley, Beechy, and many others, and I made an effort to analyze the cause of the regrettable accidents that deprived the art of some of the bravest men that ever lived, extensive study and experimentation beyond the scope of this paper resulted in the firm conviction that piloting a plane involved a problem in physiology differing essentially from the customary activities of mankind.

To the accomplished aviator piloting a good plane at moderate altitude is about as simple as walking on the earth. Between his first flight and that degree of perfection some very perplexing and unusual problems have been mastered by the student-aviator. Discovery of the reason for some of these things seems to be quite recent. Valuable information on the subject is also to be found in the records of research work done by scientists a hundred years ago.



Ruggles Orientator—Model 1



Ruggles Orientator—Model 2

Relieved of technical terms, walking, running over uneven surfaces, riding a bicycle, or similar activities may be considered as the result of muscular action directed by the brain. The marvelous beauty and intricacy of the organism by which the brain receives and verifies by comparison, the information it receives from the sensory organs, and endeavors to make corrections for errors as the muscles go into action, unfolds to the student as one goes more deeply into the subject.

Man has been popularly accredited with five senses: sight, hearing, smell, touch and taste. These sensory organs send to the brain information that falls within their limitations. When a subject may be sensed by more than one of these senses the brain, it appears, verifies the report of one sensory organ by "checking" it to the report coming from a different organ that perhaps sends information of an entirely different character, but most useful for a comprehensive understanding of the subject. Naturally the more reports that can be received the more thorough and complete the knowledge.

Loss of one or more of these sensory organs impairs this wonderful faculty and limits its scope. For illustration, loss of hearing eliminates the enjoyment of music, but the same individual enjoys fruit in all its beauty of coloring, contour, fragrance and flavor. The loss of sight limits one's enjoyment of fruit to contour, fragrance and taste, but the loss of sight in no way impairs one's enjoyment of music.

A little thought will convince us how wonderfully these senses combine in our daily activities and mention is made of them here because of the very important part some of them play in flying.

In addition to these commonly accredited senses man also possesses another most important faculty—that of orientation and equilibration. Sight and touch—including the muscle joint sense of body position—play important parts under varying circumstances, but the especial sensory organ of this faculty is the semicircular canal system of the inner ear with its ampaula, otoliths, and nerve ends, collectively called the static labyrinth to differentiate it from the aural labyrinth with which it is most closely connected.

Briefly, this organ consists of a membraneous sack out of which extend three membraneous canals lined with delicate nerve ends. These canals project around in a semi-circular shape and at the end are bulged out into an enlargement, something like the bulb of a thermometer, called the ampaula, which also contains a mass of nerve ends in the midst of which lies an otolith of limestone substance. Just beyond the ampaula the canals narrow and are again joined to the sack at a distance from their beginning, permitting them to describe some two-thirds of a circle in size, about that of the end of a leadpencil. They are so projected that

they lie in the three dimensions of space, i. e., each at right angles to the others, and the lymph that fills the sack also flows through and fills the canals.

From the ampaula end of the canals trunk nerves are bundled together to lead to the brain, and the entire organ as a unit is surrounded by the bony labyrinth to which it is attached at intervals to hold it in position, and protected in all its wonderful delicacy by the lymph that fills the intervening spaces of the bony labyrinth in which the membraneous labyrinth floats.

This organ is a part of the inner ear of birds and other animals, one being in each side of the head directly opposite the other in its relative position, and so placed that when the animal is in a natural position two canals lie in the horizontal plane sensitive to rotation about a vertical axis, and two stand in a vertical plane sensing rotation about a horizontal axis, and two are in the lateral plane sensing rotation about an axis at right angles to either of the others. Rotation of this organ causes a movement of the lymph in the canals which is sensed by the delicate nerve ends lining the canal and transmitted to the brain. Compound rotational movements are sensed by the various canals as they come into the plane of rotation, no movement being too intricate to escape detection. The nerve-ends of the ampaula sense the pressure of the otolith lying in their midst as it is acted upon by the pull of gravity, or by the inertia of changing velocity, or the difference between centrifugal force and the pull of gravity which indicates the correct banking angle while making a turn.

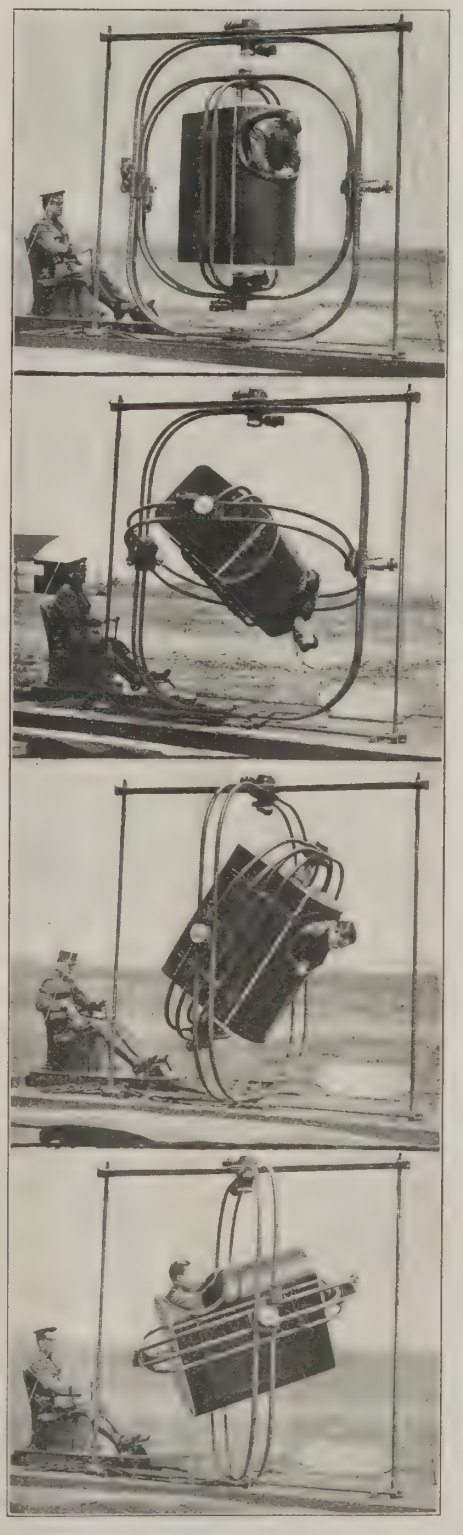
So important to life is this sense that scientists tell us it is present, in modified forms, in organisms that are not supplied with the other senses. It is of such importance to animals that it is protected by the densest bony covering in the body and operates largely through the involuntary brain. We are conscious of its activities by manifestations upon the bodily organism.

It is this little organ that enables us to stand upright on uneven surfaces in the dark and to decide quickly which of several uneven lines stand vertical. The deaf mute—born without this organ—appears to compensate for its absence by exercise of the sense of sight and touch and muscle-joint sense. However, he is utterly lost under some circumstances in which the man with a normal labyrinth is entirely at ease.

In their search for enlightenment on this subject many noted scientists have done an enormous amount of the most painstaking and delicate surgery, upon birds and animals as well as upon men who had suffered injury.

One surgeon found that the removal of the semicircular canals from a dog very seriously interfered with his muscular co-ordination. In time he appeared to compensate for the loss through the exercise of the other senses and could walk about quite well. He would always fall sprawling, however, if jumping from a height, proving that while in the air and unable to exercise the sense of touch the brain was unable to determine his position with sufficient exactness to adjust his limbs to land in a position of equilibrium.

Many of us have seen a cat while falling turn completely over and alight upon its four feet. At Johns Hopkins University Doctor Muller and Doctor Weed performed a series of most exacting experiments upon cats. It was found that all cats tried would, if held up by the feet and dropped, turn over while falling and alight upon a cushion squarely upon all four feet. It was further found that if blinded by a hood over the head the turning reflex occured with almost the same accuracy, turning to either side, seemingly to be dependent upon the initial position of release. However, the removal of one internal ear destroyed the turning reflex in a majority of the cats while hooded, and those that turned appeared to turn always in the same way, regardless of the initial position of release. If both the semicircular canal systems were removed none of the hooded cats made any attempt to turn while falling, but without the hood would turn properly and alight upon their feet.



Ruggles Orientator—Model 3

Quoting from their report, "From these observations a few conclusions may be drawn. The rotation of cats on falling seems to depend upon excitations derived either from the eyes or from the semicircular canals. Loss of either of these organs of spatial relationship does not interfere with the falling reflex, but deprivation of both these sensory fields abolishes the reflex.

Hence, it may be assumed that the falling reflex is probably an acquired form of protective mechanism, dependent on the influence from the semicircular canals and from the eyes, mediated largely, if not entirely through the cerbral cortex."

Ewald and also Howell reported very careful experimental work upon pigeons. It was found that after the removal of one of the six canals the bird would recover in ten days. And from the removal of two canals would recover in one month, as to walking. The bird was reluctant to fly, however. After all canals were cut away co-ordination was never perfectly recovered and the power of flight was lost. If the pigeon was thrown into the air it dashed wildly about until it crashed upon the earth.

Otologists find that man who has by accident or disease lost one or both semicircular canal systems suffer great derangement of the nervous system and loss of muscular co-ordination.

For a time thereafter any creature so afflicted is a most pitiable object, sprawling helplessly and moving with irregular, misdirected movements, suffering terrible vertigo. Eventually the brain does adjust itself to function without that source of information, but under some circumstances is utterly at a loss, particularly when the senses of touch and sight do not apply or are misleading.

For illustration, a normal man boards a train and notices through the window another train waiting on an adjoining track. Standing, he becomes absorbed in his paper, and presently three subconscious actions take place so quickly he may only analyze them afterward. Through the sense of vision his brain learns that his train is apparently starting, and, in response to long habit, he leans his body forward to preserve equilibrium as the train accelerates. Immediately the labyrinth warns the involuntary brain that the body is beginning to fall, and a foot is shifted to restore the equilibrium. Meanwhile, the voluntary mind, with reasoning power, becomes aroused, and the eyes, searching for additional information, find a stationary pillar which does not change its relative position, but the *other* train is seen to move past the post in the direction opposite that which his vision sense had asserted his own train was starting.

On such occasions, or when walking over uneven surfaces in the dark, a man without the labyrinth will lunge awkwardly or fall, owing to the insufficient knowledge of spatial relationship the brain is able to secure.

These extensive details are enumerated as some of the reasons why the writer was certain a super-development of the labyrinthian sense was most essential to the aviator, for, in the mobile air, his sense of touch with the ship is not entirely reliable, and his vision may be restricted, and from the moment the "ship takes the air" only his brains' ability to

(*Continued on page 787*)

SOME CONSIDERATIONS ON THE DESIGN OF LARGE AEROPLANES

By LESLIE V. SPENCER

NEVER in the history of aviation has the large weight-carrying aeroplane with long-distance flight possibilities been taken more seriously by the general public and the engineering world than at the present time. The trans-Atlantic flight has had much to do with this general interest—an interest which had previously been awakened by the many marvelous things that have been done with the big planes during the war. No doubt the expeditions of the heavily-loaded bombing machines which carried their great weight of bombs far within the German lines opened the eyes of the world to the possibilities of aerial transportation over long distances. We were shown by our own Navy that very long distance flight in heavier-than-air machines is indeed a practical reality when the NC-4 flying boat made its remarkable flight to Europe. That feat answers the doubts of those who have felt that flight across the Atlantic was most foolhardy.

Yet with all the public and technical interest that has been engendered by the London *Daily Mail's* $50,000 trans-Atlantic flight prize offer, and with the attention that other accomplishments of large aeroplanes have gained, it is a rather striking fact that, although some redesign of the standard types of planes has been made in the ships that are being put into shape for the ocean flight attempt, few points radically different from general aeroplane design as we now know it have been incorporated in the planes entered by private concerns for the race. It might be expected that at least several of the entries would have a number of special features incorporated for the express purpose of better meeting the unusual conditions to be encountered in such a long-distance aerial voyage, but in the main one is struck with the conventionality of the ships.

It does not seem to the writer that in most instances enough thought has been given to the engineering side of the matter. In their haste to build ships that will at least possess the germ of long-distance flight ability the navigators and the manufacturers back of them have been content, it seems, to adhere to types of design that have been more or less successful, rather than to strike out along new lines of thought in an endeavor to produce ships primarily intended for the kind of service at hand.

All this is by way of saying that we need more original thought in aeroplane designing. We are not at the stage in heavier-than-air machine development where we can afford to accept present types as being the last word. We must get to work and do some thinking and develop new ideas—discover how to make planes better suited for the special service for which each is intended. Almost any plane will fly if it is given enough power, but now that it is no longer a question of getting the machines to take the air, it is time to start out and *develop* them for each kind of service. The heavy, weight-carrying freight and passenger ship of long-distance ability must not be merely a larger prototype of its smaller brother, which is capable of making a name for itself in the aerial circus.

It is the writer's firm belief that the commercial future of aviation does not lie so much with the small machine of the one- or two-passenger type as with the very large plane capable of real transportation service for the world. When a man wishes to cross the ocean he does not get into a small motor boat and navigate the grim waters himself. Instead, he boards a great liner, where he can have comfort and safety en route.



© Int. Film Service

One solution of the problem of fuel carrying. The Short Brothers' plane, which made an attempt at the trans-Atlantic flight, carried a 650-gallon fuel tank under the fuselage

Therefore, let us concentrate more on the large weight-carrying machines which will operate over fixed routes, just as our ships and trains do. Let us leave the small planes for the sportsmen, explorers, the air police and the fighters.

Gasoline Carrying

Perhaps no feature in the design of large aeroplanes for long-distance flight gives the engineer more concern than the method of carrying the fuel. Up to the point where the weight of the fuel overcomes the advantage of a large supply, it is, of course, desirable to carry as great a quantity as possible. For the trans-Atlantic flight, several schemes of tank arrangement have been adopted, and the amount of fuel carried ranges anywhere from 300 gallons up. The Martinsyde machine, for instance, was provided with 360 gallons. The plane has a total weight of 5,000 pounds, and figuring 6 pounds to the gallon, the fuel weight of 2,160 pounds is over 40 per cent of the total. With the Sopwith, the total weight was 6,100 pounds. As this plane carried only 300 gallons of fuel, its gasoline weight was only about 30 per cent of the total. The Navy's NC seaplanes weigh complete about 30,000 pounds, so that, based on the same proportions, they carry anywhere from 1,500 to 2,000 gallons of fuel. These figures serve to indicate the enormous problem which the fuel raises in the design of long-distance machines.

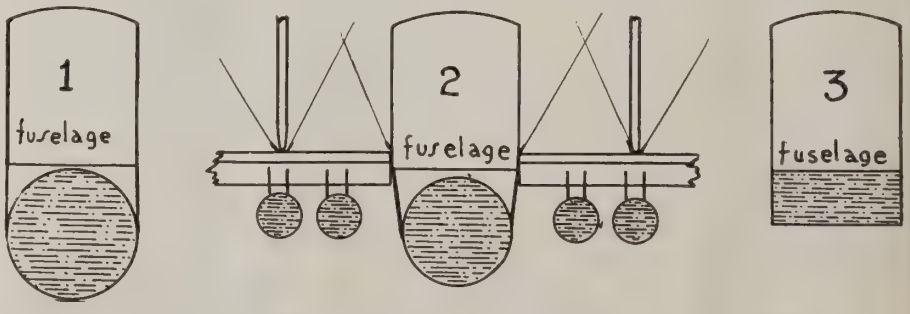
It primarily resolves itself into a question as to where and how to place the tanks so as to take as little of the body space as possible, and so that the gradual consumption of the fuel will not unbalance the ship. It being desirable to concentrate this weight as near as possible to the center of gravity of the machine, the problem is further complicated.

Interesting schemes for carrying the fuel have been worked out. The NC seaplanes have their gasoline tanks disposed around the inside of the body, which means that the fuel must be consumed in such a way that balance will always be maintained. This involves some complication.

On the Short Brothers' trans-Atlantic entry, an unusual tank location was decided upon. Instead of incorporating the reservoirs in the fuselage in some manner, the builders simply suspended a huge tank under the fuselage, as shown in the illustration. The capacity was some 650 gallons, an amount calculated to dispel any fears of the navigators that their flight would not be successful for lack of fuel. The tank measured about 16 feet in length, with a diameter of 3 feet. It is doubtful, however, if such great tank capacity was necessary, especially as the fuel weight seems most excessive, being nearly 4,000 pounds. The ship was not very large, having a wing span of 60 feet and an overall length fore and aft of 35 feet. However, the placing of all the fuel in one tank and the location of the tank are two points in favor of the idea. Roughly, this tank weighs about 600 pounds empty.

The big objection to a tank of this kind in the writer's opinion is the added parasite resistance which it offers. Instead of making it in streamline form so as to reduce the resistance, the builders apparently did not take the trouble. Even if properly streamlined, the location was certainly to be questioned from the resistance standpoint.

Although not reducing the resistance any, the suggested tank arrangement in Fig. 2 would seem to have great possibilities for trans-Atlantic flight. Suppose we support one tank of about 200 gallons under the fuselage, then under each wing hang two or more smaller gasoline drums, after the manner in which bombs are supported in the bombing type of plane. The same type of releasing devices could be employed, and after each tank had given up its fuel, it could be dropped, thus lightening the ship by an appreciable amount. By a system of shut-off valves and universal connections these tanks could be



Three suggested means of carrying a large supply of fuel for long flights

operated so that a tank under each wing would be drained at the same time, allowing both to be released simultaneously, and thereby preserving the balance. This would not be essential, however, as the difference in weight would not be sufficient to have any appreciable effect. The idea would, of course, be to use the fuel in the larger tank under the fuselage last. As a modification of this scheme, Fig. 3 shows how the main tank could be placed inside the fuselage so as to keep the parasite resistance down. Thus, after the wing tanks were dropped, the plane would have no outside encumbrances so far as the gasoline supply is concerned. Still another admirable way of carrying a large supply of fuel would be to have the tanks conform to the bottom shape of the fuselage for a portion of the way back from the engine. This would have the effect of streamlining the tanks into the fuselage assembly, and at the same time an enormous tank capacity would be provided in one reservoir. The plan would not, however, appear to have the advantages of the wing tank scheme, whereby the extra tank weight could be disposed of as soon as it had accomplished its purpose.

Retractable Chassis

While on the subject of parasite resistance, it seems pertinent to bring out the fact that not enough attention has been given to the idea of retractable chassis.

The Sopwith trans-Atlantic machine dropped its landing gear at sea, so as to cut down the resistance. This is getting rid of chassis resistance with a vengeance, but it is going at it in the wrong way. There is no doubt that means for raising the landing gear within the fuselage, or at least within streamlined compartments alongside of the body proper is bound to come, and the wonder is that none of the big planes so far designed have shown any tendency in this direction. It might not be possible to do anything with wheels which lie outside of the vertical planes of the body, but it is not a difficult matter to devise means for raising the wheels and landing gear under the fuselage. This refers to such planes as the Glenn Martin, in which outlying wheels could not easily be taken care of in this way, although the set of wheels further in could be hauled in.

Wheels

Aside from the small added weight of larger landing wheels, there would be distinct advantages to be gained by material increase in their diameter, especially where the retractable wheel idea was inbuilt into the plane. Wheels of larger diameter would not only be stronger, but they would have the important advantage of easier riding over the inevitable rough ground of the average flying field. Each little rut would not transfer as large a shock to the machine as a whole where the wheel was larger and where it did not drop into the rough places so far. Every one knows that the motor car with large wheels rides over rough ground easier than the machine with the small wheels, and it is for exactly the same reasons that attention should be given to this wheel matter for aeroplanes. Where the chassis would be designed to be brought up out of the air stream during protracted flight, it would be just as easy to make room for large diameter wheels as those of the present day small wheels.

Also, by using larger wheels, the chassis struts would not have to be so long as at present to bring the fuselage off the ground the same height as at present. This would result in the strengthening of the landing gear as a whole, since the shorter struts would have greater strength. They would also be lighter, so that when all is said and done, a chassis with large wheels and shorter struts would very likely weigh no more than the present type of landing assembly.

It might be mentioned that the wheels should be located directly below the points of greatest weight. Where the engines are located at either side of the central body or fuselage, it is desirable to have four wheels or sets of wheels: one under each engine position and two supporting the fuselage. This placing of the wheels gives assurance against side tipping when taxying, as well as relieving the structure of excessive strains under landing shocks and when running along the ground. For planes with very long wing span, it might even be desirable to have additional wheels still further out for the same reasons. Of course, many of the well-designed large machines have such wheel arrangements, but there are many instances where this important feature has been overlooked.

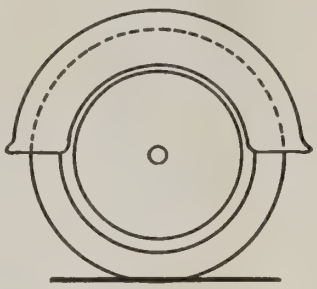


Figure 4—Fenders over the tires are desirable for heavy machines

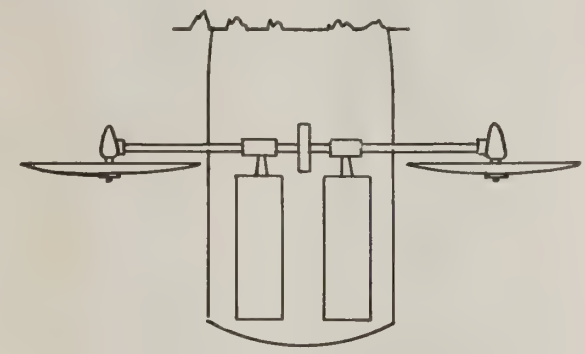


Figure 5—The J. V. Martin scheme for enclosing the engines in the fuselage

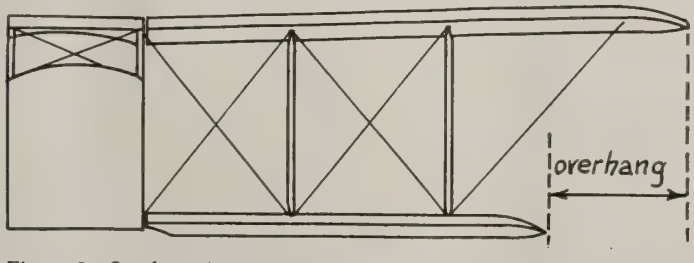


Figure 8—Overhang is not regarded as possessing sufficient advantage to offset the greater structural difficulties incident to its adoption

Mudguards

Mudguards that come down snugly over the wheels are desirable for large machines. Due to the weight, the wheels sink a considerable distance into soft ground, thus picking up more mud than do the tires of lighter planes. The guards are an effective means of scraping this off, if they are properly fitted and so arranged as to catch the mud as it comes around. The mud shields thus play a very important part in preventing damage to the under side of the lower wings, which otherwise would be badly spattered and coated with the wet substance. This causes great damage to the covering of the under side of the wings. In a number of instances where mudguards have not been used, the under wing covering has been punctured by the small stones and dirt, to say nothing of the damage done by the spattering water.

A very efficient type of guard can be designed of somewhat the shape shown in Fig. 4, and should be made preferably of aluminum, either cast or formed out of sheet stock. The metal should be of a thickness sufficient to make a rigid construction free from shaking or wobbling.

Powerplants and Their Location

As regards the methods of powering the present day large aeroplanes, it seems that in the main designers have played the game of following the leader. I do not know who it was that first hit upon the idea of placing the engines out in the wings on either side of the main body portion or nacelle, but it appears that nearly every designer has followed suit. This may or may not be the best way to position the various power units. Certainly it is not the best thing to do from the standpoint of resistance. Building strong superstructures to carry these power units in the wings is a severe structural problem, to say nothing of the great parasite resistance of the multitude of extra struts and braces such construction makes necessary.

There is a great deal to be said in favor of the practice of some designers who have concentrated the power units within the main central part of the plane. The cruiser designed by Capt. James V. Martin is of note in this respect. This ship carries its two engines side by side enclosed within the forward part of the fuselage. A cross shaft back of them leads out on either side to the propeller, a reduction gearing for each screw being provided in a small housing at the transverse engine shaft which connects with the propeller drive mechanism proper. A clutch system within the fuselage makes it possible to drive either or both propellers from one engine or from both engines. Thus it would appear that Capt. Martin

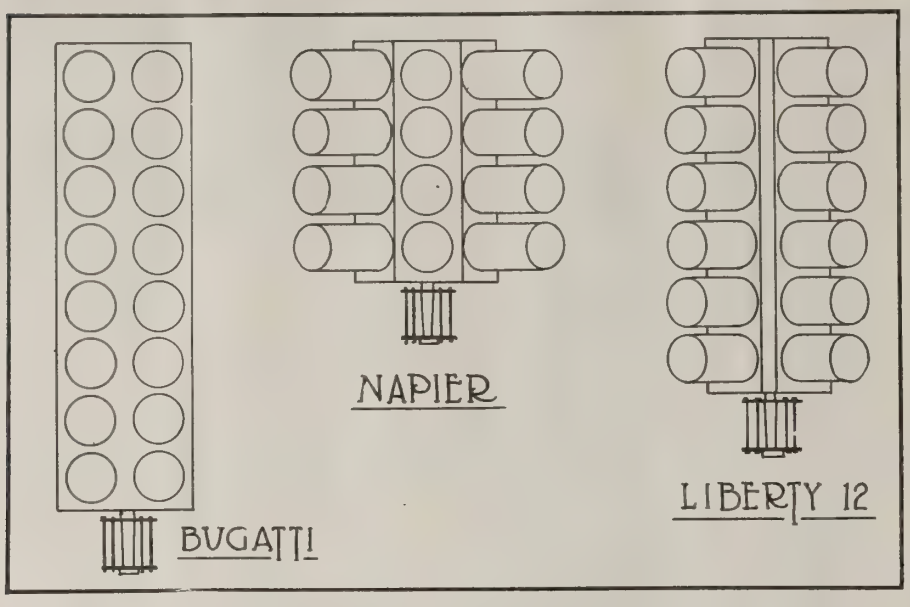


Figure 6—Some of the possible ramifications of present types of power plants

16 cylinders; 2 crankshafts. 2 banks of parallel cylinders

12 cylinders; 1 crankshaft. 3 banks of four 45° between cylinders

12 cylinders; 1 crankshaft. 2 banks of six cylinders

has all the advantages of the designs where the engines are mounted out in the wings, and at the same time he cuts down the outlying structural work and the resistance materially. The scheme of this ship's driving mechanism is shown diagrammatically in Fig. 5.

In order to centralize the powerplant within the main fuselage, other means are possible besides ranging the several engines side by side. It would not be very difficult to combine any of the present types of fixed cylinder engines by having a common crankshaft for two otherwise distinct powerplants. One set of cylinders would be upside down. In the case of the Liberty 12, for instance, this idea has been experimented with at McCook field with gratifying results. Two upper crankcases were bolted together to enclose the common crankshaft, and the standard connecting rod caps of the upper twelve cylinders were replaced with special caps having bosses to take the rods of the lower cylinders. Thus each bearing was made to carry four rods, and by special arrangement of the oiling, manifolding and water piping the resulting twenty-four cylinder engine was operated. By such an arrangement as this, the power of twenty-four cylinders could be had in little more than the space necessary for a twelve-cylinder engine.

The idea admits of a great deal of ramification. The sixteen-cylinder Bugatti type of engine shown in Fig. 6 could be similarly doubled up to form a thirty-two cylinder unit, as shown in Fig. 7, or the Napier type, in which three banks of four cylinders are employed to make a twelve, two of these could be coupled one above the other in the manner indicated in the diagram, Fig. 7. The thought can also be extended to the radials. The Salmson eighteen-cylinder radial engine might conceivably be greatly enlarged with a minimum of added space by tacking on more banks of nine cylinders each. It is easy to imagine thirty-six or more such radial cylinders being operated on the one central shaft.

By thus concentrating the power, it could be utilized either by running shafting out to the several propellers, or the screws could be placed on either end of the engine shaft with suitable gearing interposed to bring down the rotative speed to efficient values. That is, the concentrated power unit might have a tractor propeller on the front end of its shaft and a pusher to the rear. Clutches could be interposed to cut out either propeller if desired. It has been determined that a single propeller constructed by methods not at all unusual can be designed to absorb over 3,000 horsepower when geared down to somewhat under 1,000 revolutions per minute. This screw would have a diameter of about 21 feet. It would therefore be possible to hold the power of any type of powerplant that could be built up without any trouble. Further, the concentration of power in any such way as suggested would open up the possibility of using one or two large diameter two-blade screws instead of a number of smaller propellers located at various points in the machine as in a number of the present types of planes. Whether or not there would be any advantage to this is an open question, although by employing very large, slow-speed propellers it seems that greater propulsive efficiency would be probable from the aerodynamic standpoint.

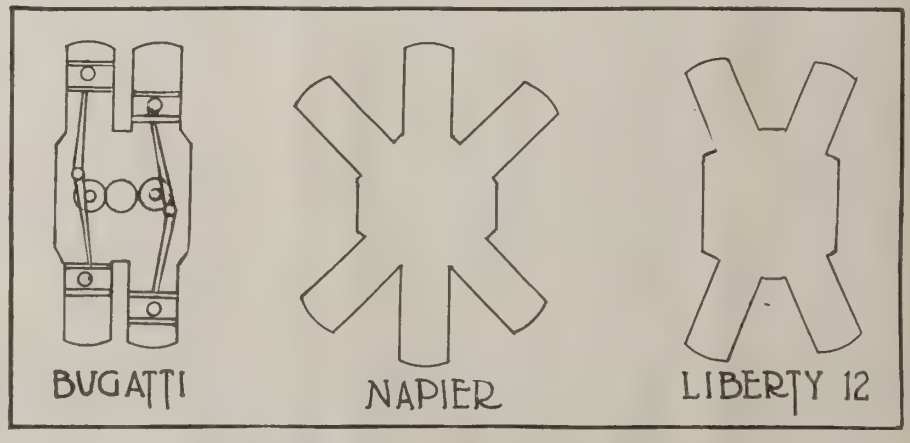
The concentration of the power into one doubled-up engine as above outlined is, however, open to the criticism that should anything go wrong the entire unit is out of commission, whereas if several independent units are employed trouble with any one has no effect upon the rest. At the same time, the same thing may be said of any plane having only one powerplant. Besides, by having all the power at one point where it is accessible at all times to the crew, it is possible to remedy slight operative faults, whereas there is no chance of doing anything to a balky unit that is placed out of reach out in the wings. From this angle it seems rather absurd to have engines so placed that they cannot be reached at all when the plane is in the air.

Overhang

The practice of extending the upper wing of a biplane combination out so that it overhangs the lower wing seems to be losing ground (Fig. 8). It should for aerodynamic investigations have indicated that there is not enough advantage to be gained aerodynamically to warrant the added structural difficulties which such a construction introduces as compared with the building of the two wings of the same length. Obviously, a stronger construction can be had where both upper and lower wing tips are in the same vertical plane, eliminating also any wire bracing from the lower end of the outer struts to the tip of the upper wing—a bracing that is almost necessary where the upper wing is given any appreciable overhang.

Conclusions

In these pioneer days of large aeroplane engineering there is utmost need of free thinking and originality of design. We have not come anywhere near the stage yet where we can accept anything as standard or conventional or final. Much is yet to be done before the aerial liner is a reality, and it is the writer's hope that these few remarks and suggestions will at least do their small part in getting aeronautical engineers to thinking along new and original lines—to strike out in new directions so that development will not get into a rut. The design which may appear as a freak to-day may prove to be a revolutionizing factor to-morrow. Aerial navigation has a tremendous future, and what we need now is independent engineering thought and design.



The next steps for the Bugatti, Napier and Liberty types

Combining 2 engines on a common set of shafts to obtain 32 cylinders

24 cylinders by combining two 12's of the Napier type engine

24 cylinders or 32 cylinders by combining two 12 or 16 cylinder engines

The AIRCRAFT TRADE REVIEW

American Handley Page Company Incorporated in New York State

Ogdensburg, N. Y.—A certificate of incorporation for the American Handley Page Company has been granted at the State capital. The company is organized "to establish aeroplane routes within the United States to carry passengers and merchandise."

The new company is capitalized at $5,000,000. The directors are William H. Workman, New York; Harry Clark, Montreal, and Julius Frank, Smith L. Sawley, and Cecil Brownlow, of Ogdensburg.

Mr. William Workman represents the Handley-Page Company of England in the United States. It is not known whether British or American built Handley Page planes will be used on the passenger and express routes to be established by the company.

Aerial Passenger Service Links Chicago With North Shore Section

Chicago, Ill.—An aerial taxi service is to be established by the Chicago Yacht Club.

The plan, as outlined by Charles H. Thorne, commodore of the club, is to operate a line of flying boats between the "exclusive north shore residential section" and the yacht club for members who desire to avoid the necessity of commuting by train and prefer the modern and comfortable flying boat.

Aerial Exhibit for Houston and Galveston

A portable building to house a permanent aeronautic exhibit consisting of aeroplanes, motors, aeroplane guns, bombs, instruments and accessories, is being assembled at Galveston, Texas. Plans for the preparation of a similar exhibit at Houston are being completed.

Champion Spark Plug Salesmen Hold Convention

Toledo, Ohio.—One hundred and twenty-five salesmen from all parts of the United States and Canada have assembled for the semi-annual Sales Convention of the Champion Spark Plug Co. to lay plans for the coming campaign under the direciton of F. B. Coswell, sales manager of the Company.

Landing Field for Chicago and Milwaukee Curtiss Distributor

George Browne, Curtiss distributer for Milwaukee and Chicago, has leased property near the Blue Mound Club, Milwaukee, for an aeroplane landing field. He will establish a passenger-carrying service and also a flying school.

Liberty Fuel to Be Produced in Quantity

Chicago, Ill.—Mayor Zimmerman, who was identified with the development of Liberty fuel during the war, which it was announced some weeks ago, adds ten miles per hour to the speed of aeroplanes and costs $1.00 per gallon to produce, is soon to be placed on the market. Methods of manufacture have been evolved which will reduce the cost of production.

L. J. Martin Buys $10,000,000 Worth of Aeroplane Linen

London, England.—A sensational one-man deal was reported recently when, for $10,000,000, the complete stock of linen held by the aircraft equipment section of the Government Disposal Board, about 30,000,000 yards, was sold to Leonard J. Martin, of the London Minories, who paid a check on account and signed a contract made in the first place for covering aeroplane wings.

This great bulk of linen represents roughly three-fifths of a year's output of the Belfast looms.

Curtiss Company Sending Mission to South America

With agencies already established in the Far East, the Scandinavian countries, Australia and Cuba, the Curtiss Aeroplane and Motor Corporation is now planning to extend operations to South America where, at the present time, planes of foreign make hold sway owing to the failure on the part of American builders to cultivate business relationships with our Pan-American neighbors.

On July 1 the Curtiss company will send a mission of expert aviators and mechanics to South America in order to demonstrate American aeroplanes and seaplanes to the officials of the Latin-American governments, corporations and private individuals, and to promote and develop aviation along military and commercial lines.

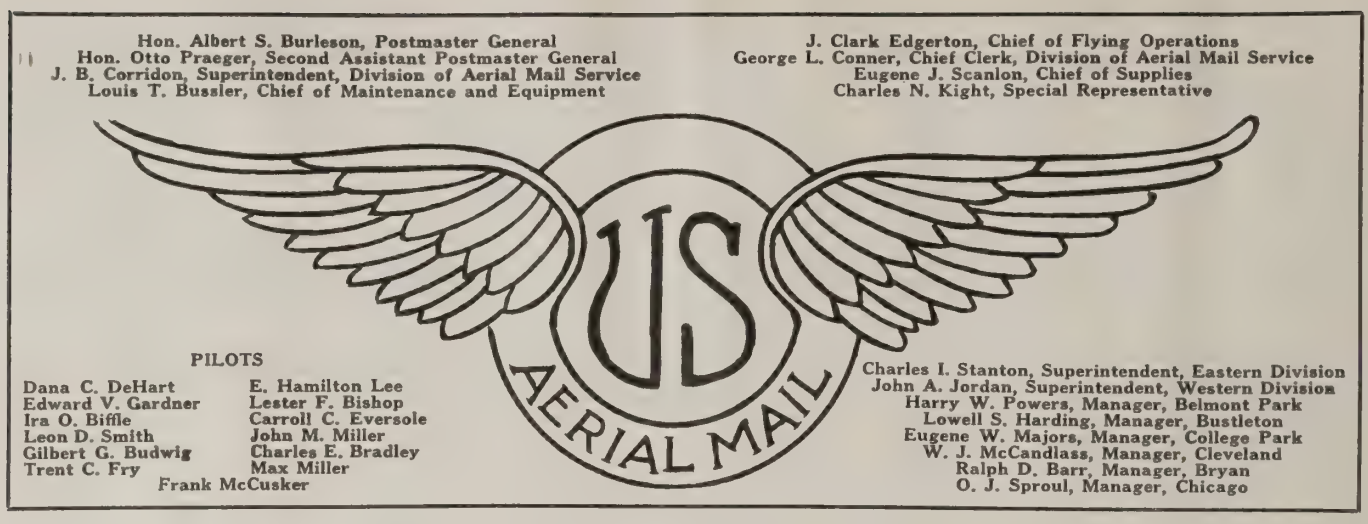
The mission will be headed by C. W. Webster, supervisor of sales for South America, and among his pilots will be Orten Hoover and Lawrence Leon, two of the best-known pilots in the United States. Hoover has been flying since 1910 and in 1915 he was sent to Brazil to inaugurate aviation for the government. Leon has also had considerable flying experience in the South American countries.

On the same vessel will go the first large shipment of aeroplanes ever sent to the Latin-American countries. The machines that will be taken include the JN-4D land machine, which was used as a training plane by the American and Canadian governments; the new three-passenger Oriole, the world's first commercial aeroplane; the Wasp, a land machine, designed by the Curtiss company as a fighting plane and which, in tests, made a new record of 163 miles an hour and a climbing record of 16,000 feet in ten minutes; the OX-5 motor, used by the government in training planes, and the new Curtiss K-6 and K-12 motors; and the Seagull, the three-passenger flying boat.

Bases will be established throughout South America and the first will be at Buenos Aires and Rio de Janeiro; later bases will be established in Uruguay, Chile, Peru and Paraguay. Demonstrating machines will also be sent to Columbia, Venezuela and Bolivia.



The Curtiss mission to South America. From left to right: Lawrence Leon, C. W. Webster and Orton Hoover



Preparations for New York-Chicago Aerial Mail Route Being Completed

Aviators of the aerial mail division of the Post Office Department are flying daily from Belmont Park out over the route between New York and Chicago, so that when the aerial mail delivery starts they will be familiar with the territory over which they will fly.

The eight hour mail service between New York and Chicago will be in operation by July 1 at the latest, and may be inaugurated some day next week. Mail will be carried in three flights between the two cities. Bellefonte, Pa., and Cleveland, Ohio, are the intermediate stations on the route.

The principal difficulty experienced by the aviators so far is the tendency of the generators of the motors to short circuit in the heavy early morning mists over Long Island. The pilots have gathered in their experimental flights much valuable information concerning prevailing air currents, emergency landing places, etc., which will make their flying easier and safer. A system of landmarks is being established and amplified so that the pilots will not go astray.

It is said that private individuals, confident of the future of commercial aviation, are attempting to obtain Government contracts to carry aerial mail west of Chicago in big three and four motored planes. The Post Office Department is considering their applications.

Extension of Mail Service to Omaha and St. Louis Planned

Aeroplane mail service to Omaha and St. Louis, thus shortening the "business correspondence distance" between the Atlantic and Pacific coasts by sixteen to twenty-four hours, will be in operation by fall, judging from results obtained on the Cleveland-Chicago route, an analysis of which has just been compiled by Second Assistant Postmaster General Otto Praeger, in charge of aerial mail.

Reports show that fifty-eight consecutive trips of 325 miles each have been made between Chicago and Cleveland without delays, without forced landings and without engine trouble of any sort. These flights have been made in weather which, a short time ago, would have been regarded prohibitive. Each day, each way, the "ships" carried 400 pounds of letter mail. As letters range from forty to forty-five to the pound, this means that 16,000 were transported on each trip.

Notwithstanding the inclement weather and the heavy loads, the postal planes—rebuilt De Havilands, equipped with Liberty motors—maintained an average speed of 98.5 miles an hour. On one occasion, when a squall prevailed throughout the lake region, and was so severe as to paralyze shipping in Chicago harbor, the mail plane reached Chicago on time and made a perfect landing on the Postal-Army Field in Grant Park. On another occasion a successful trip was made notwithstanding heavy rains which flooded the field at Bryan, Ohio, to the depth of a foot. On numerous trips fogs, which interfered greatly with both land and water traffic, failed even to delay the air mail. The reason was that engine and plane performed faultlessly, and that the pilot, in addition to knowing his course, was a competent navigator.

Twelve of the De Havilands are in the Cleveland service, four being stationed at each terminal and four at Bryan.

The service shows some interesting time results. Short as this link is, in comparison with a transcontinental line, Pacific Coast mail is even now advanced sixteen hours to Boston and New England points. The reason is that by speeding up a few hours at a vital point, the mail reaches its destination in time for afternoon delivery instead of the following morning. Pacific Coast mail, routed via aeroplane line, is delivered in New York in the morning instead of the afternoon.

Westbound, a similar saving is achieved by taking the mail from the 7 A. M. express at Cleveland, transferring it to the postal plane, and carrying it on to Chicago at almost double the speed of steam transportation.

From now on the mail planes will leave Chicago for the East at 2.30 P. M. It was found that 151 great business concerns sent special messenger mail each noon in an effort to catch the two fast mail trains to the Atlantic seaboard. This meant that much of the correspondence had to be completed the night previous. The 2.30 aeroplane service means that often eight hours to an entire day is saved, and even in the case of the special messenger delivery to the train from two and a half to three hours are saved. Incidentally, the ability of the aerial mail to land at and take off from Grant Park, which is in the heart of Chicago, is further evidence of the need for landing fields within the cities. Then complete advantage is taken of quick transportation offered by the aeroplane.

The mails are constantly growing heavier, and it is a problem to find sufficient rail equipment. Satisfactory operation of the air mail between Cleveland and Chicago has thus been the means of relieving rail congestion, and one distributing car each way each day has been cut from that division. Distribution of aeroplane mail is done in the post offices. This means that $52,000 yearly is saved, while at the same time rail equipment is released for service elsewhere and mail expedited.

The department is able to state that experiments are now being carried on looking toward the delivery and taking aboard of mail bags while the aeroplane is in flight. It is not so many years since it was thought remarkable for a fast steam train to accomplish this feat. It is now regarded as possible for the lightly loaded "ships"—those carrying 1,000 pounds of mail or less—to come close to earth and snatch bags from specially prepared apparatus. In the case of the large multimotored "ships," for which the department shortly will let bids, no attempt will be made to come near the ground, but a scheme is proposed for dropping mail—and possibly taking on—from the roofs of buildings. If this proves practicable it will be possible, on the New York-Washington route, to make non-stop runs, serving both Philadelphia and Baltimore and eliminating fifteen minute stops at each place.

Another interesting development which it is now possible to announce is the construction of fireproof walls between the mail compartment and the engine, and the compartment and the gas tank. A fireproof, airtight bag exactly the size of the compartment will be installed, and within this a second fireproof bag containing the mail pouch. In this manner, tests have demonstrated danger of destruction by fire is practically eliminated.

First Reply to Trans-Atlantic Aerial Mail Received

Washington, D. C.—When Commander Read hopped off at Trepassey Bay for the first successful transatlantic flight in the naval aeroplane NC-4. he took with him a letter from Mr. Harold Braddock, Director of the Savings Division of the Treasury Department to Sir Ribert Kindersley, K.B.E., Chairman of the British National War Savings Committee conveying the greetings of the Savings Division of the United States Treasury Department to those in charge of the British Savings Stamp campaign. According to a press dispatch a reply from Sir Robert has been received, which is said to be the first answer to transatlantic aerial mail.

SPECIFICATIONS OF MAIL PLANES

COMPANY	Unit Construction Company 1	Thomas Morse Aircraft Corporation 2	Aircraft & Engineering Corporation 4	Gallaudet Aircraft Corporation 6	Laurence Lewis Aeroplane Co. 7	Alfred W. Lawson 8	L-W-F 9		Aeromarine Plane and Motor Co. 10	Lawson Airline Transportation Co. 11	G. Elias & Bro. 13	Glenn L. Martin Company 14	British & Colonial Airline Co. 15	Charles B. Kirkland 12
							(H)	(K)						
Span Upper		46′ 6″	66′ triplane 80′						100′		106′			
Span Lower	76′ 9 11/32″	46′ 6″	66′	76′	76′	100′ 6″	105′		88′	90′ 9″	77′	71′ 5″	81′ 8″	67′ 3″
Length	40′ 9 5/8″	26′ 6″	42′ 2″	48′ 6″	49′	50′ 10″	56′ 9½″		55′ 8″	49′ 9½″	48′ 6″	44′ 10″	51′ 6″	43′ 5″
Height	14′ 9 1/16″	10′ 9″	20′	18′	16′	16′ 9″	17′ 6″		18′	14′ 6″	19′	17′ 7″	20′ 8″	13′–15′
Chord Upper	9′ 1¾″	8′ 10″	7′ 3″	12′	13′	10′ 6″	11′		12′	9′ 9″	13′	7′ 10″	8′ 6″	Not known
Chord Lower											10′			
Gap	8′ 9 7/32″	6′ 3″	8′ 4″	13″	9′ 6″ variable	10′ 3″	11′		10′ 8″	9′ 6″	11′	8′ 6″	Not known	None
Dihedral	None	2°†	5° lower outer panel	None	Reverse	Yes	2° lower		2°	1½°	4°	None	Yes	1½°
Stagger	None	None	None	None	4.0	None	None		None	None	None	None	None	None
Sweepback	None	None	None	None	None	Yes	None		None	6°	None	None	Yes	None
Wing curve	Unknown	R.A.F. 15	Sloane	R.A.F. 15	Laurence 2	U.S.A. 5	U.S. 6		Unknown	U.S. 5	RAF 3, upper RAF 6, lower	R.A.F. 15	Not known	R.A.F. 15
Area	1378 sq. ft.	750 sq. ft.	1500 sq. ft.	1740 sq. ft.	1700 sq. ft.	2220 sq. ft.	2,200 sq. ft.		2,225 sq. ft.	1,672 sq. ft.	2,044 sq. ft.	1,070 sq. ft.	1,905 sq. ft.	1,030 sq. ft.
Motors, type and arrangement	3 Lib. 12's 2 tractors 1 pusher	2 Hs 300's 1 tractor 1 pusher nacelle	12 AEC tractor & pusher opp'sd along center wing	2 Lib. 12's geared fus. tractors	2 Lib. 12's wings	3 Lib. 12's 3 tractors	3 Lib. trac. 2 fus. 1 nac.	2-300 HS between 2 fus.	3 Lib. 12's 3 tiactors 2 wing	2 Lib. 12's wing	3 HS 300's 2 shafts to wing props.	2 Lib. 12's wing	4 Lib. 12's 2 pushers 2 tractors	3 Lib. 6's geared 480 H.P. total
Weight full load (lbs.)	13,137	5,698	9,000	13,000	12,000 to 15,000	14,880	18,500		15,750	12,101	15,700	9,456	17,750	8,330
Lbs. per H. P.	12.5	8.38	15	16.25	20.2	13.4	15.41		15	16.3	17.4	11.8	11.9	17.3
Load per sq. ft.	9.37	7.6	6	7.5	8.8	6.7	8.4		7.5	7.2	7.7	8.84	9.3	8.08
Gasoline Consumption. Lbs. per H. P.	.53	.54	.50	.53	.53	.53	.53		.53	.53	.54	.53	.53	Not known
High Speed. Miles per hr.	105	122	100	119	90-100	100	112		95	110	99	108	125	115
Climb	10,000′ in 22 min.	10,000′ in 14 min.	Not known	980′ per min.	950′ per min.	8 10′ per min at 6,000′	Not known		6,000′ in 18 min.	Not konwn	730′ per min.	10,000′ in 30 min.	10,000′ in 20 min.	10,000′ in 18 min.
Service ceiling	15,000′	18,000′	Not known	15,000′	21.000′	27,000′	14,000′		15,000′	15,000′	15,000′	14,000′	15,000′†	19,000′
Buoyancy Speed	50–60	53	48	50–60	50–56	47	52		50–60	50	50	50–55	55	50
Cruising Speed	85–95	100	90	100	9 hrs. endr'ce	85–95	105		90	93	99	90	90–100	70–80
Price	$33,970	$26,650	$49,500	$29,500-10 $32,500–5 $39,500-2	$26,500	$28,000 with 3 Lib. $21,000 without	$35,000	$14,950	$45,000-10 $50,000-3-5	$24,000	$44,500	$31,600	$66,232	$34,250
Mail load and range	2,700 lbs. at 5½ hrs.	1,506 lbs. at 5½ hrs. 600 miles	1,500 lbs. at 5 hrs.	3,000 lbs.	3,000 lbs. at 6 hrs.	3,500-4,000 lbs.	2,000 lbs. at 10 hrs.		3,000 lbs. at 6 hrs.	5 hrs. 450 mi.	3,000 lbs.	1,500 lbs. at 5½ hrs.	2,600 lbs. 6 hrs.	1,500 lbs. at 8–9/10 hrs.
Fuselage and nacelle arrangements	2 fus. 1 nac.	2 fus. 1 nac.	1 fus.	1 fus.	1 fus.	1 fus. 2 nac	2 fus. 1 nac.	2 fus. 1 nac.	1 fus. 2 wing motors	1 fus. 2 wing motors	1 fus.	1 fus.	1 fus. 2 nac.	1 fus.
Equipment	With't motors or instrume'ts	Without	With	Without	Without	Without	Without		Without	Without	Without	Without	With Instruments	Without Motors

NAVAL and MILITARY AERONAUTICS

27,000 Miles of Recruiting Flights in One Week

Washington, D. C.—In addition to the thousands of miles of flying at active aviation fields giving instruction to enlisted men, forest patrols and other flights of demonstration in which acrobatics were a feature, the cross-country flying made by the U. S. Army aviators for the week ending June 14th in the interest of recruiting and reported to the Director of Air Service aggregates 27,469 miles.

Board to Select Aerial Coast Defense Sites Along Atlantic

Washington.—In connection with the plan to revise the basic coast defense system of the United States, a board of officers was appointed by the War Department recently to select suitable places along the Atlantic Coast for additional "aerial coast defense sites." Cities to be visited include Portland, Me.; Boston, Newport, New London, New York, Washington and Charleston, S. C.

Twenty De Havilands at Fort Monroe Target Practice

Hampton, Va.—The Seventy-fourth Aero Squadron, demobilized at Mineola on January 14, has been ordered reformed at Langley Field in order to work at the practice manoeuvres of heavy artillery at Fortress Monroe.

Twenty De Havilands will be used.

Dallas-Boston Fliers Have Traveled 2,400 Miles

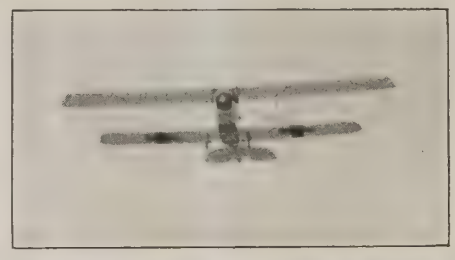
Indianapolis, Ind.—The Dallas-Boston fliers, Colonel H. B. Claggett, Commanding—five De Havilands—record cross country flying to June 17 2,390 miles in 1,556 minutes, were scheduled to leave for Dayton, Ohio, June 19th, and to arrive in Boston June 20th or 21st, making one stop between Dayton, Ohio, and Boston, either at Buffalo, N. Y., or Schenectady, N. Y., for fuel.

Naval Seaplanes Fly From Gulf to Chicago

Chicago.—Two navy seaplanes completed a trip from New Orleans to Chicago on June 17, when they alighted in Lake Michigan at the foot of East Randolph Street at 10:30 o'clock, completing the final leg of the flight from Peoria, Ill., where unfavorable weather forced an interruption of their flight from St. Louis. The planes were piloted by Lieut. Commander Stanley and Ensign Arthur.

American Aces Now Total 69

The number of American aviators who have downed five or more enemy aeroplanes now totals sixty-nine by the addition of Captain Victor H. Strahm, pilot; Captain Everett R. Cook, pilot; Captain Leonard C. Hammond, observer; First Lieutenant William T. Badham, observer reported from Le Mans, France, under date of May 10, 1919.





Upper view:—The Ellington Field Hospital plane, of which Lieut. Peterson was pilot when not instructor in acrobatics

Lower view:—Lieut. Harold G. Peterson, on duty at Ellington Field since it was opened, is one of the most skilled acrobatic fliers in the service

Lieut. Peterson Ellington Field's Most Daring Acrobatic Flier

Houston, Tex.—Second Lieutenant Harold G. Peterson, who has been on duty at Ellington Field since it was opened up in 1917, is one of the most skilled and daring acrobatic flyers of the Air Service. Lieutenant Peterson is a graduate of the University of Illinois ground school and was sent to Ellington Field as a cadet to help open up the field. For two months after receiving his commission on February 9, 1918, he instructed in acrobatics, following which he was assigned to duty as Hospital Ship pilot.

He was the first man to land an aeroplane on the Boulevard at Galveston. For this purpose the tail skid of ship was wrapped with canvas to help drag tail on slippery brick movement. Boulevard is forty feet across, with low fences and buildings on one side and the sea wall with a twelve-foot rocky drop on other. With a twenty-mile cross-wind, Peterson had to use all his skill in guiding the ship to a straightaway landing in this narrow area. This was the first hospital ship to be landed in the heart of any city and was witnessed by a large number of enthusiastic civilians. Peterson was immediately arrested by the Galveston police for fast and reckless driving of the aeroplane over the Boulevard. Colonel Lawrence W. McIntosh, Ellington's popular Commanding Officer, managed to appease the overzealous "cops" and had Peterson released.

At the Ellington Flying Frolic in April, Lieut. Peterson delighted the crowd of 15,000 with a thrilling exhibition of circling water tower in tight spirals, looping through the clouds, which hung ominously low, 100 feet over the ground, and coming out of loops and tail spins just over the ground. His exhibition prevented postponement and disappointment to the visitors.

Fast Flight From Portland to Sacramento

Lieutenant William R. Beck in a De Haviland 4 made a flight from Portland, Ore., to Sacramento, Cal., 500 miles with one stop at Grenada in 325 minutes' flying time.

In crossing the Sierra Nevada Mountains at an elevation of 12,000 feet, Lieutenant Beck encountered dense clouds, rain and snow.

New York-Seattle Mapping Trip Planned By Air Service

Washington, D. C.—In the interest of recruiting and for the purpose of charting, laying out an aerial mail route and collecting data as to municipal and emergency landing fields, a special transcontinental flight will be organized by the Air Service of the Army to leave Hazelhurst Field, L. I., N. Y., on or about July 6th having as its destination Seattle, Wash.

The tentative route will be across the States of New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Wisconsin, Minnesota, North Dakota, Montana and Idaho. Stops will be made at Philadelphia, Pittsburgh, Columbus, Indianapolis, Chicago, Milwaukee, St. Paul, Minneapolis, Fargo, Bismarck and other points en route. A distance of some 3,200 miles will be covered. The aircraft used will consist of four Curtiss JN-4H planes and Type R Obs. Balloon.

The feature of the trip will be the observation balloon demonstration. This will be transported on trucks and inflated at several of the places where stops are made. The observation balloon will be the Type R used on the front. The motor transport equipment will consist of complete machine shop with all the repairing machinery necessary carried on trucks and lorries. Special attention will be given to photography that when the trip is finished no data will be lacking for the laying out of a perfect aerial lane from New York to Seattle.

The personnel of the party has not yet been decided but it will consist of sixteen officers and thirty-six enlisted men. Eighteen to twenty weeks' time will be devoted to the work and the results determine the route of the return trip.

Air Service Demobilization

Washington, D. C.—According to reports received from the Air Service the net decrease in the total commissioned and enlisted strength from the date of the armistice to June 5 was 80 per cent.

The following table shows the present

distribution of personnel as compared with the figures of November 11 and per cent decrease. The June 5 figures do not include 284 officers and 433 enlisted men on detached service or at demobilization camps awaiting discharge.

	Nov. 11	June 5	Per cent net decrease
Cadets	6,485	187	97
Enlisted men..	170,436	33,461	80
Officers	20,852	4,946	76
Total	197,771	38,594	80

During the week ended June 5, 1919, the decrease in the Air Service personnel overseas was 626 as against a weekly average of 3,083 for the past month.

The strength of the Air Service in the U. S. and overseas on November 11, January 30 and June 5 is shown in the following table:

	U. S.	Overseas
Nov. 11.....	119,882	77,889
Jan. 30.....	46,919	57,527
June 5.....	15,249	23,345

General Menoher At Airnaut Club of Washington

Washington, D. C.—Major-General C. T. Menoher, Director of the Air Service, was the chief speaker at the meeting of the Airnaut Club of Washington at the June 2 meeting. Lieut.-Col. S. C. Clark presided.

Mr. M. W. Perley was elected President of the club. Other officers chosen were: First vice-president, Mrs. Catherine E. Warren; second vice-president, Miss Anna P. Ross; secretary, Louis E. Florey; treasurer, Albert Lariviere; to the board of governors, Mrs. Eleanor Belyea, Capt. H. C. Sigourney, Miss Rosly Carli and S. N. Bernhardt.



Captain N. B. Hall, U. S. Coast Guard officer in charge of inspection of all navy power plants and planes for the Brooklyn Aeronautic District, comprising New Jersey, Southern New York and Connecticut

Special Orders Nos. 135 to 139, Inclusive

Capt. Byron H. Mills will proceed to Kelly Field, San Antonio, Tex.

Lieut. Col. Davenport Johnson, Jr., will proceed to Chicago, Ill., on temporary duty for the purpose of conference with the department Air Service officer, Central Department; thence to Selfridge Field, Mount Clemens, Mich., take station, assume command.

Capt. Charles W. Drew will proceed to Selfridge Field, Mount Clemens, Mich, and report upon arrival to the commanding officer for duty with the first pursuit group at Selfridge Field.

First Lieut. John W. Frewer will proceed to Hazelhurst Field, Mineola, Long Island, N. Y.

First Lieut. James G. Hall will proceed to the United States Naval Air Station, San Diago, Cal.

Second Lieut. Charles M. Potter will proceed to Langley Field, Hampton, Va.

Second Lieut. Mark H. Redman will proceed to Dayton, Ohio, and report upon arrival to the chief Engineering Division, Air Service.

Second Lieut. John Earle Brown will proceed accompanied by the necessary attendant to General Hospital No. 1, New York City, and report in person to the commanding officer, that hospital, for further treatment.

First Lieut. Junius H. Evans, Air Service, is attached to the Motor Transport Corps, and when he can be released from his present duties will report in person to the commanding general port of embarkation, Hoboken, N. J., for assignment to duty with the motor transport officer, 461 Eighth Avenue, New York City.

Second Lieut. James Roy Barker will proceed to Fort Snelling, Minn., and report to U. S. A. General Hospital No. 29 for duty.

The following-named officers will proceed to Kelly Field, San Antonio, Tex.: Capt. Robert V. Gallagher, First Lieuts. Parker V. Ahl, Morris Berman, Second Lieuts. Cecil E. Archer, J. Harold Carroll.

(*Continued on page* 788)

TRANS-ATLANTIC FLIGHT PLANS

R-34 Ready to Start on Trans-Atlantic Flight

London.—The British dirigible R-34 is ready to start on the trans-Atlantic flight. She arrived on June 20 at East Fortune, Scotland, after a 56-hour test flight, which took her into the Baltic for the twofold purpose of learning whether there was any unusual activity in German shipping and to further test the machine before attempting to fly across the Atlantic.

The giant machine had a rough trip, and it is unlikely that she can be ready to start for America under ten days, the earliest estimates being a week. Just how far she proceeded up the Baltic it is impossible to learn, as the Government has cautioned the officers and crew against saying anything with regard to the trip. It is learned, however, that the ship went abreast of Berlin, just outside the three-mile limit.

The airship battled against a strong westerly wind during 20 hours of the homeward journey. Colonel Hunt, commanding the station here, has suggested to the Air Ministry that the flight across the Atlantic be postponed for a fortnight. It is estimated that the total round trip of the Baltic totaled 1,200 miles.

The R-34 will not not fly to the United States as planned until the German decision to sign or reject the peace terms is made. If the Germans reject the allied terms her cruise may be eastward on a less friendly mission than her visit to America.

No official word, however, that the flight of the big British dirigible R-34 to this country has been postponed has reached Lieut.-Col. Frederick W. Lucas, R. A. F., who is in this country to prepare for her coming

Special wireless communications regarding weather conditions are now being sent out to aid the pilots of the big dirigible in planning their voyage. The messages will be extended as soon as the start is made and the information sent in much greater detail. Regular signals will be sent out to assist in guiding the air voyagers from wireless stations at Bar Harbor, Boston, Newport, New York and Cape May. At Roosevelt Field another radio station is to be set up to communicate between the ship and the ground while the landing is being made.

Handley Page Waiting for Good Weather at Harbor Grace

Harbor Grace, N. F.—With all preparations and tests completed, the four-motored Handley Page is still waiting for favorable weather. Despite their eagerness to get away, however, it is by no means certain that they will depart at once, as they are determined to await an ideal wind, since otherwise the task they have set themselves of beating the Vimy's distance record is hopeless. Admiral Kerr and the other fliers are particularly anxious to depart for fear that there may be some change in the plans ordered by headquarters.

Major Geoffrey I. Taylor, meteorological officer of the expedition, is in St. John's, camping close beside Lieutenant Lawrence L. Clemens, the Air Ministry meteorological officer, to whom come all official weather reports. Major Taylor will flash word here the moment he decides conditions are suitable for departure.

The Alliance Aeroplane Company, Limited, of England, which had completed all preparations for sending its biplane Seabird to Newfoundland to attempt the ocean crossing, has canceled all arrangements and withdrawn its entry. Word of this was received from the firm by its advance representative, Lieutenant Williams, at St. John's recently.

Plans of the Boulton and Paul Company to start two fast planes to Ireland have been abandoned, according to a cable message received here by Major Fiske, the representative at St. John's of the British firm.

Alcock and Brown Given Knighthood in Order of British Empire

London.—When Captain Alcock and Lieutenant Brown received, at the hands of War Secretary Churchill, not only the *Daily Mail's* $50,000 prize at the *Mail's* luncheon in their honor on June 20th, but knighthood in the Order of the British Empire, bestowed by the King, there had ensued, unknown to hundreds present, a little dialogue between Brown and American Ambassador Davis.

Brown wanted to know if he would jeopardize his American citizenship by accepting knighthood. The Ambassador relieved his mind by telling him that as a private citizen he had every right to accept it. So Brown becomes Sir Whitten Brown, and the Vickers-Vimy pilot Sir J. Alcock.

Besides the *Daily Mail* prize, the airmen received $10,500 from a cigarette company here and $5,000 from another source. In his speech Brown said they decided before leaving St. John's to invest the money in the British Joy Loan.

Brown intends, after his marriage to Miss Kennedy, early in July, to return to America.

FOREIGN NEWS

Entries for Australia-England Competition Received

Mr. Bert Hinkler is the first airman to enter for the Australian Government's $50,000 prize for a flight from Great Britain to Australia (15,000 miles in 720 hours). He will fly a Sopwith "Dove" biplane with 80 h.p. Le Rhone engine, and he is rapidly completing his arrangements at the Sopwith Aviation Co.'s works, Kingston-on-Thames. The second entry for the flight was made at the Royal Aero Club on Saturday by Lieutenant C. E. Kingsford-Smith, M. C., on behalf of himself and two companions, Lieutenant V. Rendle and Lieutenant Cyril B. Maddocks, all Australians. The Blackburn Aeroplane Co. has provided the machine, a Blackburn Kangaroo, with two Rolls-Royce Falcon No. 2 engines, each of 255 h.p.

London-Birmingham Passenger Service

The first passenger aeroplane from London to Birmingham landed at Bromwich Castle last week. It was a Handley Page machine, piloted by Colonel W. S. Douglas. Leaving Cricklewood at 5:30, the aeroplane arrived at Birmingham at 8:45, having dropped parcels of London newspapers at Nottingham and Northampton en route. Lord Belper was one of the passengers.

Parseval Building 75-Passenger Dirigible

It is announced from Bitterfield that the Parseval Works have almost completed the construction of a giant airship, capable of carrying 75 people. It will be used for crossing the Atlantic.

Book Proofs by Aeroplane Save Publisher Two Months

Mr. Patrick Thompson is publishing *Cocktails* (a collection of tales on aeronautics) through Collins & Sons. The proofs of the book, consigned to the ordinary land and sea mail service on March 7th, took nearly two months to reach him. After correction the proofs were entrusted to some friends from 110 Squadron on their way back from the R. A. F. Sports Tournament at Vron. The packet was taken to the halfway aerodrome on the Folkestone-Cologne air mail route and handed to the first home-going pilot. The packet left at 11:30 a.m. and was in the publishers' hands that night.

Winston Churchill is Taking Flying Lessons

Mr. Winston Churchill has resumed his flying lessons, which were interrupted at the beginning of the war. He is going through his course at Hounslow on an Avro machine in charge of an R. A. F. instructor.

Netherlands Government Purchasing Planes for Java and East Indies

The Netherlands East Indian government is considering the purchase of twenty aeroplanes of the bombing type for operation between Japan and the islands it owns in the Far East. Although intended for commercial use, it is planned to have the aeroplanes for military reasons should the occasion arise.

British Columbia Mining Company to Use Aeroplane Transport

The Queens Mines, Inc., of Nelson, B. C., are negotiating for the purchase of aeroplanes to operate between their Nuget Mine, on top of a mountain, and the coast, fifteen miles away.

Brussels Gets Live Lobster from Paris by Aeroplane

Brussels.—Regular transportation of merchandise by aeroplane between Brussels and Paris, established by companies in the two cities, has already resulted in some unusual cargoes being carried. For instance, a consignment of nearly 500 pounds of live lobsters was brought to Brussels by one of the aeroplanes of the system. The lobsters were in excellent condition.

Aerial Service for Brazil

Under the terms of a Brazilian government decree, as published in the "Diario Oficial" of Rio de Janeiro, J. B. dos Santos and A. de Araujo Goes are empowered to establish an aerial service, without privilege or monopoly, for the transport of passengers and mails between the principal cities of the country and the intermediate towns. Two years are allowed for the establishment of the service, but an extension of time may be granted. The service is intended principally for passengers and goods, but the concessionaires are obliged to carry mails. The timetable and fares will be fixed with the approval of the government, and will be revised every three years.

31 British Companies Are Now in Aeroplane Insurance Combine

London.—Thirty-one British insurance companies are now in the aviation accident and liability insurance combine which has pooled liabilities and premiums.

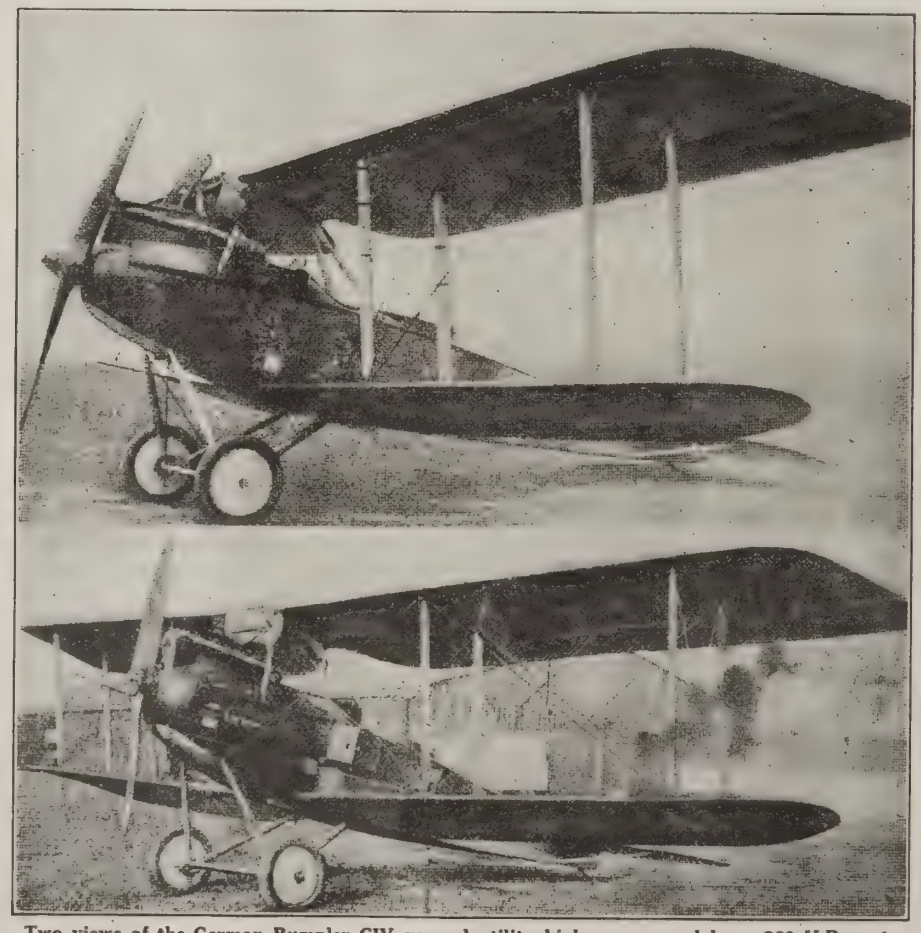
English Hotel to Have Air Service

It is stated that the Birkdale Palace Hotel will shortly begin a private air service. Guests from the Isle of Man or Blackpool who wish to travel by air will be waited upon by hotel aeroplanes. This is believed to be the first hotel air service in Europe.

Thos. Cook and Co. Arranges Aerial Tours

Evidence that the commercial development of the aeroplane is proceeding by leaps and bounds is indicated by an advertisement inserted by Thomas Cook & Sons, tourist agents, in the London Times during the Easter holidays.

The agency advertised aeroplane pleasure trips over Cricklewood, near London, on Easter Monday. More than a thousand men, women and children availed themselves of the opportunity and for two guineas each had a half hour flight over Cricklewood. Handley Page machines were used in the flights.



Two views of the German Rumpler CIV general utility biplane, powered by a 260 H.P. motor

Shanghai-Pekin Passenger Service Being Arranged by Pekin Syndicate

The Pekin Syndicate, Ltd., has recently purchased several Handley Pages to operate a line between Shanghai and Pekin, a distance of 700 miles. A fast passenger and mail service will be established.

Casale Again Sets New Altitude Record

Villacoublay.—Adjutant Casale, the French aviator who established a new world altitude record of 31,168 feet recently, broke his own record on June 14 by ascending in his aeroplane to a height of 10,100 metres (approximately 33,136 feet).

The flight was made in fifty-five minutes. The temperature at the high point was eight degrees below zero.

All Air Force Planes Required to Have Parachutes

London.—Compulsory fitting of life-saving parachutes to all aeroplanes of the Royal Air Force has been decided upon by the government. Whether this will be applicable also to commercial aircraft has not yet been settled.

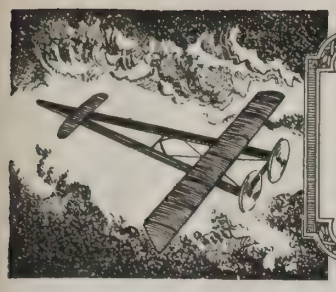
Catches Aquitania by Aeroplane

London.—After missing boat and train to Southampton on June 14 for the Cunard liner Aquitania, Mrs. Leon Errol adopted the novel method of flying by aeroplane to the port of embarkation.

She obtained an aeroplane at Hounslow, from where ascent was made. After a flight of an hour and fifteen minutes the machine descended five miles from Southampton, where she was met by the captain of the ship, who motored her to the docks, catching the boat.

Parachute and Collapsible Boat to Make Over-Water Flying Safer

Rome.—The trial of a new parachute was carried out on May 9 over the sea off the port of Anzio. The parachute, with Lieut. Emerson, an American officer, who was also provided with special collapsible pneumatic boat, was safely launched. Lieut. Emerson alighted on the water from a height of 420 metres, and then got into the boat.



ELEMENTARY AERONAUTICS and MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W.
Washington, D. C.
AERO SCIENCE CLUB OF AMERICA
Beach Bldg. E. 23rd St.,
N. Y. City
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

Prizes for Aerial Age Contests

THE accompanying cut shows a reproduction of the prizes which AERIAL AGE is offering for the Model Contests which are now going on throughout the country. Hundreds of model flyers are striving to win the cup and the medals.

The cup is a work of art and, with the inscription engraved on the front, makes a very appropriate prize for the best construction model. It was intended at first to offer a bronze cup with silver trimming, but this was later changed to one of silver with a gold lining. This cup is the goal to which many experienced model builders are working, and from the photographs and descriptions received by this department, the winning model will be a work of art. Some of the scale models of which details have been received can fly, and, of course, this will be a point in their favor when the winner is declared. The way the winner is decided is very fair. Should a good scale mode be capable of making short flights, it would, of course, be declared better than the one that did not fly. Then, on the other hand, if an exceptionally well-constructed and designed model should come along, it would be given preference over one that could fly.

The medals on each side of the cup are very well designed, as the reader can see at a glance. Any one of these medals would make a watch fob, if the winner should not care to use it as it is. A full list of the winners will appear in the first available issue of the July numbers, as well as photographs and specifications of the machines.

It is requested that all those who have not as yet sent in their reports of flights do so without further delay, as it takes time to judge the qualities of the models. If you should send them early, the winner could be declared without waiting until the summer is too far gone.



The beautiful prizes shown above were made and designed by the Arthur Johnson Company. These people are the originators of aeroplane jewelry and they have turned out the best workmanship possible to create the medals and trophy for the Aerial Age winners

Light Flying Boat

With the next issue is started a design of a two-seater flying boat of low horse power and very light weight. Since the Ford Motored Aeroplane was described on this page some months ago, the writer has been asked by numerous flying enthusiasts to tell through these articles whether the Ford Motored Aeroplane could be fitted with pontoons. We did not endeavor to answer this question at that time because tests were being made with one of these machines to determine the reserve lifting power, and until these tests were completed nothing could be determined.

We have since found that the Ford develops much more horsepower at the propeller than was first supposed, and we do not hesitate to say that the machine was was described on this page can be made to rise from the water with lightweight pontoons. We can be closer in our figures for the flying boat now that we know exactly what power the Ford will develop.

In order to get sufficient power from the Ford, it is necessary to have it running at about 2,000 R.P.M. with propeller of 6 foot diameter and pitch of about 32 inches, when connected direct, or to have the propeller geared down, that is, to have the engine running fast and the propeller running at half speed. This combination gives more horsepower, and a propeller of 7 foot diameter with 4½ foot pitch can be used instead. This will give us enough pushing power for the flying boat to be described later.



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

The Vikings of the Air

Like Norsemen bold who launched their sturdy craft
On seas that stretched beyond their furthest ken,
And drank deep draughts of ocean's briny air
With keen delight, and sailed they knew not where,
So stand ye at the Atlantic's mist-bound shore,
Ready to leap into the buoyant air—
Ready to span, with wings outstretched on high,
The ocean turbulent, 'neath the wind-swept sky.

Knights of the air, on high adventure bound,
Our hearts with yours in unison do beat.
Faint not nor fear to risk the uncharted way
And taste the glories of the risen day.
Like you, we, too, into the unknown launch!
Each morn a misty vista doth unfold;
Dark clouds above and ocean waves affright,
But all our paths are in the Pilot's sight.

—*Josephine M. Fabricant* in the *New York Times.*

Has your left shoe one of these new aeroplane tongues? One that has a tendency to sidestep?—*E. L.*

In "Civies"

Where are the girls who used to smile,
  And the rides I used to get,
And where is the crowd that was very proud
  To pass me a cigarette?
Time was I danced with maidens fair
  And captured their hearts by storm,
But I've lost my pull with the beautiful
  Since quitting the uniform.

I've sunk my shoes into Turkish rugs
  That only the rich can own;
At tables fine I've been asked to dine,
  In the heart of the social zone.
In the cushions deep of a limousine
  I have rested my manly form,
But I've lost my graft with the tony craft
  Since quitting the uniform.

I've been a king on the ballroom floor,
  An ace in the social whirl;
I could show my face in any old place,
  And never a lip would curl.
I could walk right up to a rich man's door,
  And be sure of a welcome warm;
But I've changed a lot, and they know me not
  Since quitting the uniform.

Now I walk down town and the autos pass,
  And nobody says "get in!"
And the girls are shy when I'm standing by
  And they give me the tilted chin.
And nobody knows and nobody cares
  Whether I eat or how;
I must buy my own chuck, for I'm out of luck—
  I'm wearing the "civvies" now.

—*Edgar A. Quest* in *Rockwell Field Flight.*

The Atlantic Flight

As the fledgling from the nest
  Flutters forth to meet the wind;
As the traveller trekking West
  Hurries on with gladsome mind
Over burning sands uncrossed;
As the sailor, tempest tossed,
  Eager-eyed for countries new;
So they scan the ocean grey,
  Watch the clouds that scamper by—
Hopeful for propitious day
  On their pinions frail to fly.
Youth is glorious and bold,
And the New World with the Old
  Will be hand-clasped by their might.

—*W. L. A.* in *Aircraft.*

Solution of a Pressing Problem

Wifey: "Darling, I've lovely news for you. I engaged a servant yesterday, and she's just arrived."

Hubby: "You priceless old thing. Hope we'll be able to keep her."

Wifey: "Oh, I hope so. Suppose, darling, you go down to the hangar, and do something to the engine of her 'plane. Then she'll have to stay a week at least."—*Aircraft.*



That young aviator who called on Sis that terribly hot evening made himself good and solid with the rest of the family

—By Fontaine Fox in the N. Y. "Globe"

EVERY FIRST CLASS AEROPLANE REQUIRES A RETRACTABLE CHASSIS

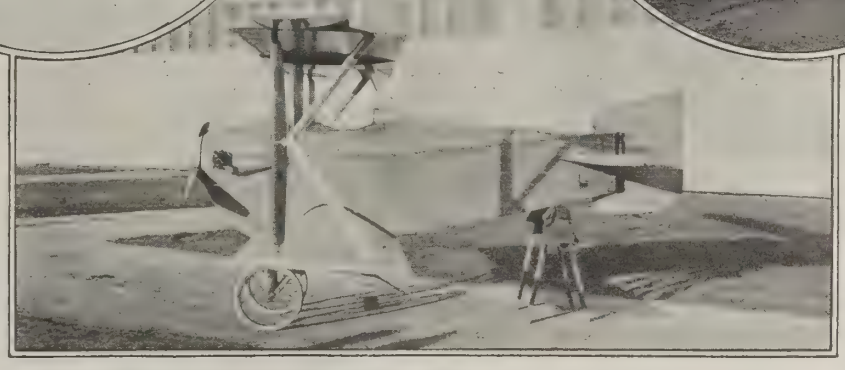
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Chassis Retracted



First Shock Absorbing Rudder



First Retractable Chassis

No other light scout of low horsepower can even approximate the performance of the K 3 for the following reasons:

1—The Retractable Chassis, protected by both basic and improvement patents for any shape, or method of retracting, eliminates 17% of the useless or parasite resistance.

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3—The Martin form of wing end, proved both in America and Europe, the most efficient shape.

4—The Shockabsorbing Rudder which simplifies rudder bracing and control, provides exceptional taxing manoeuverability and eliminates the Parasite resistance of the usual tail skid.

5—The Wing end Aileron, proved by actual tests in full flight to be four times as efficient as the trailing edge aileron, leaves the K 3 wing aerofoil unimpaired.

6—The structure of the K 3 has a **tested safety factor of eight** and weighs complete with motor only 350 lbs. (Compare this with the weight of other 40 h.p. scouts.)

Exclusive manufacturing rights for a similar commercial plane designed around a reliable 40 h.p. American motor for sale for 5% of the gross sales.

CAPT. JAMES V. MARTIN, U. S. Master Mariner and pioneer aeroplane builder who originated and demonstrated in 1911 the modern tractor biplane in all its essential features, such as interconnected trailing edge ailerons, tail decalage and a modern type fuselage with clamp longeron fittings.

All the Martin devices are freely at the disposal of the U. S. War Department and can be used on reasonable terms by other constructors.

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(Incorporated)

"We have the altitude record for service in the insurance field

AND

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Portable Hangars for J.N.-4 Curtiss

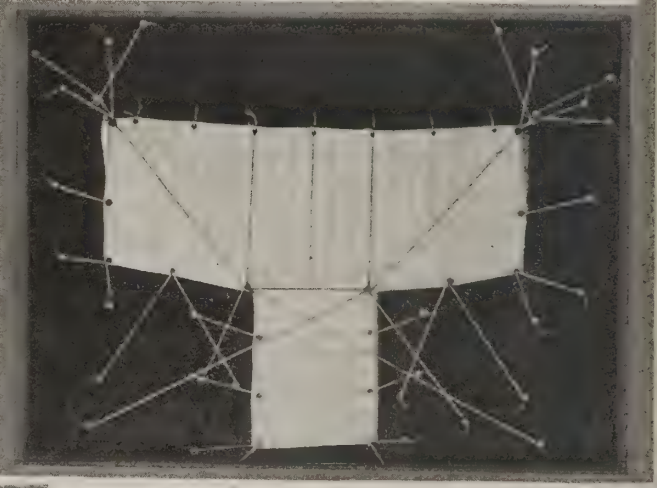
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Fit like the glove to the hand.
Simple as A-B-C



AIRPLANE in hangar. Note room for camp beds at each side under top plane. Front wall closes on cable at top and lashes in center. Non-detachable pegs at bottom make it wind and rain proof.



BALANCE of power for wind resistance through double crossed guys removes strain from any one point and insures perfect safety in storms.



CAREFUL tests of canvas strength have proven the value of rope reinforcement. The heavy guys shown are built into the hangar

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The Martin Plane is First to Fulfill Commercial Requirements

Our Freighter and 12-Passenger Airplane soon to be announced

THE GLENN L. MARTIN COMPANY
CLEVELAND

Contractors to the United States Government

(*Continued from page 773*)
correctly determine spatial relationship and direct calm, precisely co-ordinated muscular action, prevents his return to earth in a splintering crash.

That this faculty is capable of extensive development is proven daily. The rubber tires of the bicycle have no nerves, yet the trick bicycle rider performs wonderful feats in equilibration by the aid of this little organism.

Wonderful and infallable as this labyrinth appears, however, the student of this subject locates in some of its peculiarities the cause of many an aviator's fatal crash. It senses rotation with remarkable accuracy, but if the rotation exceeds the degree to which the individual is accustomed and then stopped, it continues to "register" rotation—but in the opposite direction. This is a false impression, for the person is motionless, and on the earth is usually detected by the sense of touch, which is less effective in the sky, for the ship has a free rotational possibility.

Further, the vision is so closely associated with the semicircular canals that when this false rotational sensation is felt objects before the eyes appear to be rushing past at the same rate of speed, though the man and the objects are both perfectly stationary. This continues and diminishes to the vanishing point only when the motion of the lymph in the canals and the displaced nerve ends have resumed their position of rest.

If a man be whirled in one plane of rotation rapidly and then tilted into a different plane and held motionless, he feels this false rotational sensation, with its accompanying visual effect, but in the latter position. That is, the effect is felt in the plane in which the canals are held that have endured the excitation regardless the first position.

This phenomenon affects the aviator in various ways. In the fast tail spin the lateral canals are in the horizontal plane and accumulate rotational sensation. Coming out of the spin, though the ship be brought out perfectly level, the student aviator will feel that false rotational sensation, for the lateral canals have brought it with them from the spinning position, and as though verifying it for true, the eyes are affected to such an extent that the horizon appears to tip up at an acute angle. This sensation may be interpreted by the experienced pilot, but the beginner has a tendency, in trying to keep the ship level, to go into a side slip and another spin in the opposite direction, which sometimes continues to a crash.

Another peculiarity of this organ appears in the variations to which it is subject. Its dependability is affected by worry, illness, or exhaustion.

Also the man that becomes entirely familiar with certain rate of spins or turns, by exceeding the rate of angular velocity or the number of turns he makes in spinning may find the same confusion, for while a slower motion does not confuse, a rate faster than he is accustomed to, confuses.

We know that fancy ice skaters, spinning dancers, and other trick performers by practice endure extraordinary gyrations without confusion. Our first acrobatic flyer of note is reported to have been a circus performer before becoming an aviator.

The writer believed these faculties of vital importance in piloting an aeroplane capable of almost limitless development and training, if it might be conveniently continued to proficiency without apprehension or accident. And that when so developed and trained the student-aviator could be taught the art of managing a ship in the sky with the minimum of danger to his instructor and to himself, and the maximum of comfort and dexterity in future flying.

Inventing an apparatus that might provide the student-aviator the rotational possibilities of the plane in the air, and at the same time the facilities for developing the so essential muscular co-ordination without the likelihood of injury to himself or his assistants was not an immediate accomplishment. Almost endless were the plans considered, improved, and discarded. Persuading men of position to believe in the idea or the invention was even more difficult. The average aviator of a few years ago did not believe he had a static labyrinth, and the average hard-headed business man was not interested in sixth-sense problems, and was inclined to doubt the possibility of the machine operating as predicted, or producing the effect if it did.

The Ruggles Orientator, Model 1, was completed under the auspices of the Naval Consulting Board. It immediately demonstrated the soundness of the inventor's contentions. This was followed by Model 2, and then by Model 3, which has been made standard for the United States Army Air Service.

The faculty of orientation varies in individuals quite as much as other faculties. Also the ability to co-ordinate quickly, but smoothly, the muscular actions that will guide the ship. This is strikingly demonstrated by the students working in the Ruggles machine.

The beginner who is confused by the unusual position and who "freezes" or jams his controls, or cannot time his muscular actions to the positions or evolution he tries for, or becomes dizzy after a quick turn, with a little careful attention of the instructor quickly overcomes all these

In the Past!

An ANZANI-ENGINED SINGLE SEATER

First Flew the English Channel



MARYLAND PRESSED STEEL CO.

Aircraft Manufacturers Hagerstown, Md.

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Harry E. Tudor, Sales Manager, 299 Madison Avenue, New York City

difficulties and improves with surprising rapidity in manoeuvering blindfolded through predetermined evolutions. Soon his spatial relationship senses become so accustomed to the unusual positions that the dangerous involuntary, unintelligent muscular movements give place to calm and intelligently directed actions, and the interference of the instructor's dual control is met with intuitive correction. The false turning sensations that follow rapid manoeuvers are interpreted and involuntarily compensated for. The tendency to dizziness diminishes.

The direction of men's bodily activities may be compared to the navigation of a steamship. The commander decides upon the course, speed, etc., and gives instructions to the Officer of the Watch, who will, in event of unfamiliar danger, consult the Commander for more authoritative decision. It is of the utmost importance, however, that he be a thorough seaman, for when a trusted lookout calls warning of a danger so imminent that the Commander may not be consulted disaster is averted by his soundness of judgment and immediate action.

Man's voluntary (reasoning) brain is the commander of the body. The involuntary brain is the "officer of the watch"—that takes charge while the commander is otherwise occupied. The most favored lookout is the always active static labyrinth. To the man who pilots an aeroplane it is of supreme importance that this combination of officer and "lookout" be trained to a calm and correct appreciation of as many situations as possible.

The Ruggles Orientator, calling into action some of the most vital functions of life, with its many special attachments, affords opportunities to the otologist, the physiologist, and the psychologist, and also to the merely practical student-aviators.

(*Continued from page* 781)

The following-named officers will proceed to Rockwell Field, San Diego, Cal., and report in person to the commanding officer for assignment to duty with the 2d Aero Squadron: First Lieut. Ross F. Cole, Second Lieuts. Charles A. Batty, John Blaney, William E. Olssen, Jr., First Lieut. Sidney P. Le Boutillier, Second Lieuts. Charles McK. Robinson, Hjalmar F. Carlson, John J. Curtis, Jerry L Bennett, Elbert W. Franklin, Raymond P. Birdsall.

The following-named officers will proceed to Hazelhurst Field, Mineola, Long Island, N. Y., and report for assignment to duty with the 3d Aero Squadron: First Lieut. Richard J. Kirkpatrick, Second Lieuts. Mark R. Woodward, Philip H. Downes, First Lieut. Clarence L. Midcap, Second Lieuts. Kenneth Garrett, William C. Maxwell, First Lieut. Leo Fred Post.

The following-named officers will proceed to Wichita Falls, Tex., Call Field: Second Lieuts. Robert T. Gallagher, William B. Atwell.

The following-named officers will proceed to Detroit, Mich., reporting upon arrival to the commanding officer Aviation General Supply Depot for discharge under the provisions of Circular No. 75, War Department, 1918: Capt. William F. Long, First Lieut. Rossiter H. Kellogg, Second Lieut. Robert H. Carson.

Major George E. Lovell, Jr., Air Service, is detailed as a member of a board of officers appointed in paragraph 83, Special Orders, No. 135-O, June 10, 1919, War Department, vice Major Albert D. Smith, Air Service, hereby relieved.

First Lieut. George M. Palmer will proceed from Ellington Field, Houston, Tex., to the aviation repair depot, Speedway, Indianapolis, Ind.; thence, by aeroplane, to Bolling Field, Anacostia, D. C.; thence, by aeroplane, to Langley Field, Hampton, Va., on temporary duty in connection with the Air Service of the Army, and upon completion of the duty enjoined will return to his proper station, Ellington Field, Houston, Tex. The purpose of the travel is to fly a Handley Page aeroplane to Langley Field, Hampton, Va., and the stop at Bolling Field is for the purpose of receiving several cameras.

First Lieut. Clarence G. McCarn will proceed from Kelly Field, San Antonio, Tex., to Rockwell Field, San Diego, Cal., and will report upon arrival to the commanding officer for assignment to duty with the 2d Aero Squadron.

First Lieut. James B. Wallace will proceed to Fort Monroe, Va.

By direction of the President, Capt. William E. Scarboro is dropped from the rolls of the Army under the provisions of section 1229, Revised Statutes.

Capt. Frank A. Llewellyn is transferred to Garden City, Long Island, N. Y., and will report to the Air Service depot for duty.

First Lieut. Harry M. Carroll will proceed to Selfridge Field, Mount Clemens, Mich.

The following-named officers will proceed to Call Field, Wichita, Tex., and report in person to the commanding officer for duty: Second Lieuts. George H. Beverly, Paul H. Prentiss.

Second Lieut. George A. Clark will proceed to Washington and report in person to the Director of Purchase, Storage and Traffic for assignment to duty in the office of the Director of Finance.

First Lieut. Clifford G. Sample is announced as on duty requiring him to participate regularly and frequently in aerial flights from April 30, 1919.

Second Lieut. Rowan A. Greer will proceed to Rockwell Field, San Diego, Cal.

First Lieut. Joseph R. Pearson, Jr., will proceed to Dayton, Ohio, and report in person to the Chief Engineering Division, Air Service, for duty.

Capt. Herbert A. Thorndike will proceed to Washington, D. C., and will report upon arrival to the Director of Air Service.

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AERIAL AGE WEEKLY

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A Remarkable Photograph of a Group of Planes from Ellington Field Flying in Formation Over Houston, Texas

Pathfinding Aeroplane Tourists Will Visit Aircraft Factories

UBLISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY
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PATHFINDING AEROPLANE TOURISTS WILL VISIT AIRCRAFT FACTORIES

THE Pioneer Aeroplane Tours of the Aerial League of America announced in the last number of AERIAL AGE are to be preceded by pathfinding tours, the first of which will take the aerial tourists on a visit of the great eastern aircraft factories.

In the first pathfinding tour the aerial tourists will fly to and inspect the following aircraft factories:

They will start from the Atlantic City Airport and fly to Keyport, New Jersey, and visit the plant of the Aeromarine Plane and Motor Company at Keyport.

From Keyport they will fly to the Roosevelt Field at Garden City, Long Island, where they may stay overnight and visit the plant of the Curtiss Aeroplane and Motor Corporation at Garden City the following morning .

Then they will fly to New Brunswick, New Jersey, where they will visit the Wright Martin Aircraft Corporation, the makers of the famous Hispano-Suiza motors.

Next they may stop at Trenton and visit the Roebling plants, which make, among other things, the wire, cables, and other metal products used in the construction of aeroplanes.

They will then fly to Philadelphia and may visit the Naval Aircraft Factory as well as the Unit Construction Company. Time permitting the tourists will also visit the Hess-Bright Manufacturing Company, The Carlson-Wenstrom Company, and the Janney-Steinmetz Company.

The Committee in charge of arranging the Pathfinding Aeroplane Tours includes: Major Reed, G. Landis, second ranking American Ace, Captain Charles J. Glidden, John P. Davis, Major Redonds B. Sutton, veteran U. S. Army Aviator; Henry Woodhouse, Inglis M. Uppercu, Earl L. Ovington, Joseph A. Steinmetz, president Aero Club of Pennsylvania; Albert T. Bell, president Atlantic City Aero Club; G. Douglas Wardrop, and Major Harry Bubb.

In the pathfinding tours to follow, the tourists will visit the aircraft factories at Ithaca, Rochester, Buffalo, Erie, Cleveland, Toledo, Detroit, Dayton, Indianapolis, Chicago, and other cities.

$65,000,000 TO BE APPROPRIATED FOR ARMY AND NAVY AERONAUTICS

THE House and Senate have approved the conference reports on the army and navy appropriation bills, which save the army air service from disintegration and enable the navy to embark on its plans for development of a lighter-than-air programme as already outlined by Secretary Daniels.

The conferees agreed upon giving army aviation $40,000,000, instead of the $15,000,000 originally appropriated by the House, and $25,000,000 for naval aviation instead of the $15,000,000 decided upon by the House, and the $35,000,000 asked by the Secretary of the Navy.

Definite indication of the navy's intention to embark at once on an extensive experimental and building programme with lighter-than-air craft is indicated in the itemized statement of naval appropriation allowances.

The largest single item is that of $6,700,000 for continuing experiments and development work for all types of aircraft. In line with this appropriation are $3,700,000 for construction of two large dirigible hangars on government land, $1,500,000 for construction of a dirigible, $2,500,000 for purchase abroad of a dirigible of the latest type, $500,00 for conversion of the collier *Jupiter,* sister ship of the missing *Cyclops,* into an aeroplane carrier, $100,000 for purchase abroad of five special type 'planes and $700,000 for conversion of two merchant vessels into aircraft tenders.

In addition, $3,027,250 is allowed for fleet aircraft purposes; $3,008,007 for maintenance and operation of an aircraft factory, helium plant and aircraft stations.

ALLIES' CONVENTION OUTLINES AERIAL NAVIGATION RULES

AN international convention setting forth the medical requirements for aerial navigation as adopted by the Aeronautical Commission of the Peace Conference at Paris was made public in Washington. Although this international convention was adopted at Paris on April 12 and was sent to Washington several weeks ago, it was to be kept confidential until the signing of the Peace Treaty. It fixes 19 years as the minimum age for air pilots and navigators, stipulates physical and medical requirements, and provides that every candidate before obtaining a license as pilot must present himself for examination.

The requirements set forth in the convention are minimal. Each State may change the conditions, as it deems fit, but these minimum requirements should be maintained, in the opinion of those who signed the convention on behalf of the five principal allied powers, the United States, Great Britain, France, Italy and Japan. Here is the text of the international agreement:

"International medical requirements for aerial navigation.

"1. Every candidate before obtaining a license as a pilot, navigator, or engineer of aircraft engaged in public transport will present himself for examination by specially qualified men (flight surgeons) appointed by or acting under the authority of the contracting State.

"2. Medical supervision, both for the selection and the maintenance of efficiency, shall be based on the following requirements of mental and physical fitness:

"(a) Good family and personal history, with particular reference to nervous stability. Absence of any mental, moral or physical defect which will interfere with flying efficiency.

"(b) Minimum age for pilots and navigators engaged in public transport shall be nineteen (19) years.

"(c) General surgical examination: The aeronaut must neither suffer from any wound, injury or operation nor possess any abnormality, congenital or otherwise, which will interfere with the efficient and safe handling of aircraft.

"(d) General medical examination: The aeronaut must not suffer from any disease or disability which renders him liable suddenly to become incompetent in the management of aircraft. He must possess heart, lungs, kidneys, and nervous system capable of withstanding the effects of altitude and also the effects of prolonged flight.

"(e) Eye examination: The aeronaut must possess a degree of visual acuity compatible with the efficient performance of his duties. No pilot or navigator shall have more than two (2) dioptres of latent hypermetropia; muscle balance must be good and commensurate with the refraction. He must have a good field of vision in each eye and must possess normal color perception.

"(f) Ear examination: The middle ear must be healthy. The aeronaut must possess a degree of auditory acuity compatible with the efficient performance of his duties.

"(g) The vestibular mechanism must be intact and neither under hypersensitive nor hyposensitive.

"(h) Nose and throat examination: The aeronaut must possess free nasal air entry on either side and not suffer from serious acute or chronic affections of the upper respiratory tract.

"3. Each contracting State shall for the present fix its own methods of examination until the details of the tests and the minimal standard of requirements have been finally settled by the authorized medical representative of the I. C. A. N.

"4. The successful candidate will receive a medical certificate of acceptance which must be produced before the license can be issued.

"5. In order to insure maintenance of efficiency every aeronaut shall be re-examined periodically, at least every six months, and the findings attached to his original record. In case of illness or accident, also, an aeronaut shall be re-examined and pronounced fit before resuming aerial duties. The date and result of each re-examination shall be recorded on the aeronaut's flying certificate.

"6. No aeronaut who, before the date of the present convention, has given proof of his flying ability, shall, so long as he retains such ability, be necessarily disqualified because he fails to fulfill all of the above requirements.

"7. Each contracting State may raise the conditions set forth above, as it deems fit, but these minimal requirements shall be maintained internationally.

"Signed by the representatives on behalf of

"United States: Isaac H. Jones, James B. Stanford.

"Great Britain: Martin Flack, A. P. Bowdler.

"France: George Cuillain, Jules Levaire.

"Italy: Lieut. Col. Guideni, signing for Di Nola and Mattoli.

"Japan: K. Miura.

"Paris, April 12, 1919."

WHAT NEXT?

WHAT does there remain for aeroplanes to do now that the Atlantic has been crossed? was the question asked of the representatives of different countries assembled at the Atlantic City airport to witness the tests of the British Guardian Angled parachute. Thereupon they practically resolved themselves into a committee for the discussoin of the future of aeronautics, and what was forecast would make Kipling and Jules Verne appear conservative. The party, some of whom are very old-timers in aeronautics, included Capt. Pierre Bosc, member of the French High Mission, who served in the French Air Service since the beginning of the war; Capt. Carlo Tappi, acting Italian Air Attaché, who has been in the Italian Air Service since 1911, when he was one of the Italian aviators who fought the Turks on African soil; Major Orde Lees, who has been in the British Air Force for a number of years; Henry Woodhouse, vice-president of the Aerial League of America, who has been foremost in fostering the development of aeronautics for the past ten years; Earle L. Ovington, the veteran American aviator, who made the first aerial mail experiment in 1911; Albert T. Bell and Harry B. Cook, of the Aero Club of Atlantic City, who organized the meet in 1910 at which Glenn H. Curtiss and some of the other early aviators flew, and where the then marvellous altitude record of 5,000 feet was made. Now the altitude record is 33,000 feet; also A. S. Abell, 3rd, of Baltimore, who participated in the flying events held in that city in 1910; Joseph A. Steinmetz, who has been president of the Aero Club of Pennsylvania for the past six years; Eddie Stinson, the veteran aviator, and others.

After witnessing the convincing tests and demonstrations of the remarkable "Guardian Angel" parachute aerial life preserver at the Atlantic City airport, the experts, as usual, gathered at the beautiful home of the Abell family on the Boulevard, near the airport, which has been named "Pilots' Port and Aeronautic Arcadia," and there discussed the future of aeronautics from every standpoint.

Captain Bosc told of stupendous flights made by French aviators across the African deserts, across the Mediterranean Sea and across the Great Atlas Mountains; Captain Tappi told of flights made by Italian aviators in Africa, and of aeroplane passenger-carrying lines across the Apennine Mountais; Major Orde Lees told of flights of British aviators from London to Africa and to India, and of plans to establish aerial transportation lines throughout the British Empire.

Henry Woodhouse, vice-president of the Aerial League of America, summarized the things that still remain to be done by aeroplanes as follows:

"The magnificent flights of the American and British aviators have just opened the tremendous possibilities for aerial achievements.

"Here are a few of the things still to be done:

"(1) Cross the Atlantic by direct flights from the United States to England, France and Italy.

"(2) Carry one thousand pounds of mail in a non-stop direct flight from the United States to England, thereby demonstrating the utilitarian value of trans-Atlantic air lines.

"(3) Make a non-stop flight from New York to San Francisco first, then carry a thousand pounds of mail or passengers on subsequent flights.

"(4) Fry from New York to San Francisco within one day's daylight.

"(5) Cross the North Pole from Cape Columbia to Cape Chelyuskin, as proposed and planned by Capt. Robert A. Bartlett.

"(6) Fly to Hawaii.

"(7) Fly to the Philippines.

"(8) Fly across the Pacific.

"(9) Complete the aerial conquest of the Atlantic by flying it by each of the following routes:

"(a) By way of the Azores, then to Madeira, then to either Spain or Africa;

"(b) From South America to Barbadoes and across to the Canaries;

"(c) From Cape Orange to Cape Verde and then to the African coast;

"(d) From Pernambuco to St. Paul Island, then either to Cape Verde or straight to the African coast;

"(e) By way of Greenland and Iceland to the Faroe Islands and from there to England.

"(10) Fly to Australia and New Zealand.

"(11) Fly across Alaska and demonstrate how aerial transportation will help that rich country.

"(12) Fly from the United States to Brazil and Argentine, and also from the United States to Chili and Peru and other Latin-American countries, and show the marvellous possibilities of aerial transportation in South and Central America.

"(13) A great many high mountains still remain to be conquered by air.

"(14) The deserts still are to see the permanent air lines which will make travel pleasant even across deserts.

"I could go on quoting at least fifty more things which should be done, but these give a good idea of what remains to be done by aircraft. As I have said, the splendid achievements of Commander Read and his gallant crew, and of Captain Alcock and Lieutenant Brown, have only just opened the possibilities for real achievements in aeronautics and for making aircraft useful to the world."



THE NEWS OF THE WEEK



Iceland Establishing Air Service to U. S.

Washington, D. C.—According to official advice, Iceland intends to establish a regular air service between Reykjavik, its capital, and the Eastern ports of the United States.

P. A. Olafson, consul at Reykjavik, is quoted as saying that two hydro-aeroplanes, with sufficient power to accomplish a trans-Atlantic flight, are already in commission, and that a large aeroplane corporation has been formed to bring about regular aerial voyages between Iceland and the United States. The present two hydro-aeroplanes will be "tried out" in the circumnavigation of Iceland.

The American-bound plane will "take off" at Reykjavik and fly about 500 nautical miles to the southern tip of Greenland, where facilities will be provided to refuel and repair any damages. The next stretch will be approximately the same distance, from Greenland to Newfoundland, and thence to the United States. The same route will be taken on the return trip.

Atlantic City-Long Island Record Again Broken by Sopwith Camel

Atlantic City, N. J.—Another flying record was established on June 28, when Lieut. Kenneth M. Murray, in a Sopwith camel, flew here from Mineola, L. I., in fifty-one minutes. Lieut. Murray left Mineola at four minutes past twelve o'clock and landed at five minutes before one. He clipped ten minutes off his flight of June 24 from here to the Long Island field. The flyer was congratulated on his arrival at the Airport by officials and a large number of spectators.

Lieut. Murray fought through a northeast storm and a fifty-mile gale.

Worcester Landing Field Being Selected

Worcester, Mass.—Realizing the importance of establishing adequate aerial landing facilities along the New York-Boston air route, Mr. J. Walter Flagg and other interested business men have been deciding on the most suitable tract in or near Worcester which can be made into a first-class landing field in accordance with Government specifications. Airmen who have flown over Worcester regard it as an excellent locality for a landing place, there being a marked absence of rough air and pockets.

Two sites are under favorable consideration, one on Brattle Street, a part of the A. S. Lowell estate, the other on Newton Hill.

Lieut. Quick in SVA Scout to Bring Willard-Dempsey Photos for New York Paper

The practical value of the aeroplane will be subjected to a good test in connection with the Willard-Dempsey fight, for the New York *World* has arranged to despatch a fast machine from Toledo, immediately on conclusion of the fight, with photographs of the event designed for publication in the *World* on the following morning.

The machine is an Italian SVA, one of the fastest types yet designed, one which did noteworthy service during the war. The pilot of the SVA will be Lieut. Raymond B. Quick, who saw much service with the 95th Pursuit Squadron (American) in France.

The SVA will leave Toledo immediately after the fight. If its flight is successful, the pictures of the fight will be in the papers the next morning.

The ordinary time of delivering these photographs in New York by train would be about fifteen hours; by aeroplane it should be about five.

Prince of Wales to Be Starter for Toronto-New York Aerial Race

Toronto.—An international aerial race, which will start simultaneously from Toronto and New York, will be held on August 25, with the Prince of Wales as the starter, it was announced here recently. Stops will be made at Buffalo, Syracuse and Albany.

A prize of $5,000 and a trophy have been offered by John M. Bowman of New York. It is expected there will be more than two-score entries.

Handley-Page Bomber Flies From Indianapolis to Washington, 505 Miles, In 285 Minutes

Washington.—A Handley-Page bombing plane, carrying two pilots and five mechanics, on June 24 covered the 505 miles between Indianapolis and Washington in 285 minutes. The pilots were Lieuts. G. M. Palmer and G. L. Bradford. No stops were made. Rain fell almost continuously throughout the flight, but did not retard speed measurably.

Huge Aerial Stunting Exhibition at New York Police Field Day

Frederick A. Wallis, Deputy Police Commissioner, announced that the greatest flying exhibition ever witnessed in this country will be held on the afternoons of the police field days, to be held at Sheepshead Bay Speedway Saturday, July 19, and Saturday, July 26.

Mr. Wallis said that fifty-six aeroplanes participated in the army games last August, but that he expected Colonel Miller will have a far greater number participate in the police aerial exhibition, as there are more than twice that number of aeroplanes available at the aviation fields on Long Island.

Kansas City-Fort Worth Air Line to Open July 4th

Kansas City, Mo.—The first regular aeroplane passenger service out of Kansas City will be to Fort Worth, Tex., with stops at Coffeyville, Kan., and Tulsa, Oklahoma City and Ardmore, Okla.

Charles Ora, local manager of the Commercial Airship Syndicate, of Fort Worth, stated a small dirigible would make the trip in July. It is hoped to have everything in readiness for the pilot trip July 4.

Mr. Ora said his company had ordered a "sport blimp" dirigible from the Goodyear Tire and Rubber Company. The July trip will be for the purpose of completing arrangements at stations for landing facilities.



The "Airco 16", a remodelled de Havilland with a salon for 4 passengers. The lower view shows a lady passenger about to enter

R-34 Rapidly Overhauled After 2,000-Mile Baltic Flight

East Fortune, Scotland.—The overhauling of the great British dirigible R-34, in preparation for a flight across the Atlantic, has been so rapid that she is ready to start as soon as ordered to do so. The weather, however, continues unsettled.

It has been necessary to install one new motor and overhaul four others, and to do considerable work on the huge envelope, since the rough trip of approximately 2,000 miles the R-34 made over the Baltic. This work has been pushed as rapidly as possible, so that there may be no further delay in making the attempt to cross the Atlantic.

Handley-Page Still Waiting for Weather

Harbor Grace, N. F.—The Handley-Page trans-Atlantic expedition has entered on the third week of waiting for weather conditions that will make possible a start on the projected flight from Newfoundland to England. When that time may come is more uncertain than ever.

With the abrupt and unexpected changes that have come during the last few days, the aviators have added actual worry to their vexation over the delay. The time is really not far distant when the machine will become physically unfit for its intended task, and the resources of the plant here are such that restoration might prove impossible. In that event, there would be nothing to do but to dismantle and send the huge craft ingloriously back to England by steamship.

Had work been continued on the big portable hangar brought here, it would now be serving a valuable purpose. The hangar, which had been half erected, is, however, merely a jumble of scattered parts, awaiting shipment to Toronto, and the biplane is exposed to the weather, with no protection except tarpaulin covers for the engines and propellers.

The Martinsyde plane is entirely rebuilt and has been under test. Lieutenant Biddlecombe, Captain Raynham's navigator, has been at St. John's for over a week and assisting in the preparations for the attempt to lower the Vickers-Vimy speed record.

Dallas-Boston Flight Record

Washington, D. C.—The Dallas-Boston flight, which was completed on June 23 by the seven De Havilands which left Dallas on May 15, made the following flying schedule, which does not, of course, include the exhibition flights made in the interest of recruiting at the stopping places:



Valspar delivered to Allentown by aeroplane

From	To	Miles	Min.
Dallas	Oklahoma	208	105
Oklahoma	Camp Funston.	300	170
Camp Funston	Topeka	60	45
Topeka	Kansas City....	67	45
Kansas City	St. Joseph & return	80	70
Kansas City	Belleville	285	200
Belleville	Indianapolis ...	210	145
Indianapolis	Chicago	165	100
Chicago	Milwaukee	80	40
Milwaukee	Minneapolis ...	300	195
Minneapolis	Milwaukee ...	375	290
Milwaukee	Indianapolis ...	260	151
Indianapolis	Dayton	110	65
Dayton	Cleveland	200	122
Cleveland	Buffalo	185	132
Buffalo	Albany	260	150
Albany	Boston	130	66
	Total	3276	2091

The average speed for the entire flight is 93.96 miles per hour. The following officers and men participated in the flight: Commanding, Col. H. B. Claggett; Pilots, Major J. W. Simons, Jr., Major Roy S. Brown, 1st Lieut. Jack E. Duke, Jr., 1st Lieut. Benj. H. Adams, 2nd Lieut. John Pulm, 2nd Lieut. Robt. F. Midkiff. Observers, Capt. W. H. Chandler, Capt. Herfluegel, Sgts. 1st Class Ralph Kratz, Wayne Neville, J. A. Smith, Harry H. Aliman.

Talbot Flies From Dayton to Mineola in Six Hours

J. E. Talbot, Jr., president of the Dayton-Wright Aeroplane Company, of Dayton, Ohio, arrived at Mineola from Dayton on June 17 in a DeHaviland aeroplane.

The time of the flight was five hours and fifty-five minutes. Howard Rinehart, a civilian, was the pilot.

Guardian Angel Parachute Demonstrated at Dayton

Major T. Ord Lees, who during the war was in charge of parachute development for the Royal Air Force, is going to McCook Field at Dayton for the purpose of carrying on parachute demonstrations in order that the Engineering Section will be able to take advantage of the work. It may be that after the tests are finished at Dayton the detachment will return to Washington to give demonstrations at Bolling Field.

With Major Lees is Lieut. R. A. Caldwell, D. F. C., who jumps from aeroplanes to demonstrate the adaptability of the parachute. The interesting feature of the party is the presence of Miss Sylvia Boyden, a young lady of twenty, who also jumps from an aeroplane. According to Major Lees, the jumping of this young lady has a wonderful effect on the public in that when they see a lady land safely they have more confidence in parachutes than when a man descends. Miss Boyden is accompanied by Mrs. A. M. Thomas as chaperone.

The first demonstration of Major Lees' parachutes were given at the Atlantic City Airport.

Forest Patrol Fliers Cover 7,615 Miles in Week

Washington, D. C.—Owing to the exceedingly dry weather prevailing, the balloon school at Arcadia has been maintaining aerial patrol both day and night.

During the week ending June 21, the Mather Field Staff, stationed at Sacramento, Cal., made twenty-one flights over the National forests, discovering four fires, which were reported to the Forestry Service at Placerville, Cal. The total mileage of the patrol was 3,000, and the patrol pilots were 53 hours in the air.

The March Field Staff, Allessandro, Cal., made twenty-four trips, occupying thirty-eight hours, covering 2,500 miles. The Rockwell Field Staff, San Diego, Cal., made eight flights in twenty-six hours and twenty-six minutes, covering a distance of 2,115 miles.

Summary for week ending June 21, not including the balloon observation: Minutes in the air, 7,046; miles of flight, 7,615; number of flights, 53; number of officers and men participating, 15.



The Fiat BR Biplane, with a speed of 160 miles an hour, is powered by a 700 H.P. Fiat engine, the type which will be used for a trans-Atlantic non-stop flight

RETURNING NC FLIERS ACCORDED ENTHUSIASTIC WELCOME

GREETED down the bay by five seaplanes, two blimps, and a score of naval and private water craft, bearing their families, official committees, and hundreds of well-wishers, Lieutenant Commander Albert Cushing Read, U. S. N., and the crew of the victorious NC-4, first air machine to cross the Atlantic, returned to New York on the transport *Zeppelin*. On board the *Zeppelin* were also Commander John H. Towers of the NC-3 and Lieutenant Commander P. N. L. Bellinger of the NC-1 and members of their respective crews. Leaden skies and a steady downpour interfered with the success of the aerial demonstration planned in their honor, but the enthusiasm of those who braved the elements to welcome the aviators was not lessened. Outside the piers at the Port of Debarkation, Hoboken, a crowd waited for the appearance of the aviators and gave them a send-off as they rode away in automobiles.

When word was received that the *Zeppelin* had reached Quarantine, the official boats started down the bay. The submarine chaser *Herreshoff*, carrying the wives and relatives of the returning aviators and the *Manhattan* with a delegation from the Aero Club of America.

The *Manhattan* carried men most prominent in aeronautical circles in this city. She also had on board J. F. Towers, brother of the NC commander, and his wife, and Miss Mary Towers, a sister of the commander.

Others on board were Glenn H. Curtiss, Alan R. Hawley, Rear Admiral Bradley A. Fiske, Captain Robert A. Bartlett, Major S. H. Mapes, Major G. A. Pollock, Henry Woodhouse, Colonel W. G. Barker, the Canadian ace who has sixty-eight Germans to his credit; H. Pushae Williams, president of the Queens Chamber of Commerce; W. W. Mountain, Evan J. David, E. V. Hazelton, H. B. Childs and G. Douglas Wardrop.

The several welcoming committees gave the airmen a noisy greeting. The *Zeppelin* did not stop in the lower bay, as is usually the custom, but continued up the river with its escort of welcomers. The seaplanes did not continue all the way to the piers.

As the *Zeppelin* slipped into Pier 4 at the port of debarkation, a military band broke forth into the tune of "Hail, hail, the gang's all here," while the group on the pier cheered the men who were lined along the railing of the top deck. With Commander Towers leading, the fliers walked off the steamship and lined up in single file, the NC-1 men having the place of honor at the extreme right. Salutes were exchanged between the commanders and Rear Admiral James H. Glennon, representing Secretary Daniels, following which the latter said:

"In the name of the Secretary of the Navy I welcome you home and congratulate you upon your splendid achievement which has reflected so much lustre on

(*Continued on page* 825)



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Wives and children of NC fliers waiting to greet aviators on landing. Left to right: Mrs. H. C. Richardson, and daughter Margaret; Mrs. P. Talbot, Mrs. Walter Hinton, Mrs. J. C. Montfort, Mrs. Albert C. Read, Mrs. Patrick N. Bellinger, Mrs. John H. Towers, Mrs. James L. Breese, Jr., and daughter Francis



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Lieutenant-Commander A. C. Read and his crew, Lieut. E. F. Stone, Lieut. Walter Hinton, Ensign Rodel, Chief Mechanic E. R. Rhoades, Lieut. J. L. Breese, accompanied by Commander John H. Towers, Lieut.-Commander Bellinger, Ensign Harry Sadenwater, being greeted by Alan R. Hawley, Henry Woodhouse, Lieut. David H. McCullough, Colonel Archie Miller, Rear-Admiral Glennon and others upon their return to the United States

The AIRCRAFT TRADE REVIEW

Wright-Martin Merger Details Revealed

The details of the merger proposal submitted to the stockholders of the Wright-Martin Aircraft Corporation, which provides for virtual absorption of the Wright-Martin Company, with its $7,000,000 in cash, by the International Motor Truck Company, are as follows:

Wright-Martin Corporation preferred stockholders will receive in exchange for their stock first preferred stock of the International Corporation having a par value equal to par value and accumulative dividends of Wright-Martin Corporation preferred stock deposited.

Wright-Martin common stockholders shall receive 2.8 shares of second preferred stock of a par value of $100 each and two shares of common stock without par value of International Corporation for each 100 shares of Wright-Martin common stock.

Wright-Martin common stock shall be reduced so that for each 100 shares of common stock there shall be issued twenty-five shares of Wright-Martin stock in addition to the stock of the International Corporation stock to be taken in exchange.

The date to which accumulated dividends on the deposited Wright-Martin preferred stock will be paid in International first preferred stock will be fixed not earlier than September 1, 1919, nor later than the issuance of the new stock.

If the plan is accepted the Wright-Martin company will sell to the International Corporation all of its properties at New Brunswick, N. J., with the possible exclusion of certain motors and machinery acquired especially to fill government contracts. Other property will be retained by the Wright-Martin company. This will include its agreement with the Hispano-Suiza company granting license rights in the United States; interest in the cross license agreement of aeroplane patents; Wright patents and Simplex patents; interest in the United States Government war contracts for Hispano-Suiza engines and the lease of the Simplex Service Station in Long Island City with equipment and inventory.

Dr. Cantu, Caproni's Business Representative, Arrives Here

Dr. G. Cantu, formerly in the Italian Air Service, arrived recently in this country, coming from England, where he has been for some time making connections with British concerns in behalf of the Caproni Company.

He will act in the United States as business representative for the noted Italian designer, Mr. G. Caproni, and will be assisted in his work by Captain U. V. d'Annunzio, former chief engineer of the Caproni Company.

Dr. Cantu brought with him very interesting data concerning the new five-engine passenger triplanes now in production in the Milan plants of the Caproni Company.

Dr. Cantu has made his headquarters at the Biltmore Hotel, New York City.

Courses in Aeronautical Engineering at the University of California

Berkeley, Cal.—The curriculum in Mechanical Engineering at the University of California will hereafter include a course in Aerodynamics, given in the senior year. An endeavor will be made to present the fundamental principles underlying the design and construction of the aeroplane, and to trace the application of these in commercial types of recognized merit.

A laboratory is being equipped with an aeroplane, type Curtiss JN-4D, with a vertical and a rotary aeronautical engine, and with miniature wind channels for student use.

The treatment of internal combustion engines is being altered to include the design principles of the aeronautical engine.

The course is at present a part of the Mechanical Engineering curriculum and it is the intention to continue it as such for some time to come. The addition of this work broadens the present curriculum for mechanical engineers by including aerial transportation in the general transportation problem.

Champion Spark Plug Salesmen Hold Convention at Toledo

Toledo, Ohio.—The seventh mid-year sales convention of the Champion Spark Plug Company, held in Toledo the week of June 9-15, was a record-breaker in many respects, particularly from an attendance standpoint. Over 125 factory representatives of the big Toledo concern answered present to the roll-call on Monday morning, this being the largest gathering of salesmen ever brought together by a manufacturer of spark plugs.

The convention program this year included regular business sessions every morning and afternoon, at which officials of the company, heads of the different departments and a number of specialists in other lines of business addressed the men on various subjects relating to salesmanship. The opening day was devoted to talks by officials of the company. President R. A. Stranahan welcomed the men to Toledo and Sales Manager Caswell spoke on "Selling Without Misrepresentation." Robert Martland, secretary California Trades Association, addressed the afternoon session, followed by H. L. Corey, advertising manager, and O. C. Rohde, chief engineer of the Toledo concern. In the evening, special cars were run out to the Toledo Yacht Club, where dinner was served.

On Tuesday morning the sales force left for Detroit to inspect the Jeffery-Dewitt plant, where the famous 3450 Champion insulators are produced. A new leer or tunnel kiln over 300 feet long was the chief center of attraction, although every step in the art of making porcelain proved a study in itself. After a luncheon at the Detroit Athletic Club, the delegation of salesmen crossed over to Windsor, where special cars were waiting to take them out to the site recently purchased by the Champion Spark Plug Company for its Canadian plant. Mayor Winter and a number of other Windsor officials were present for the ground-breaking ceremonies, the Mayor turning the first sod. The return trip to Toledo was made by boat, everyone enjoying the five-hour sail down Lake Erie.

The rest of the week was devoted largely to business sessions at the Champion Convention Hall. The big banquet of the week was held at the Toledo Club on Thursday evening, the feature of which was the distribution of cash prizes awarded by Mr. Caswell to members of the sales force. Seventy-three prize checks totaling several thousand dollars were given to those who had shown unusual ability during the past year.

Friday and Saturday the men were grouped for special class meetings supervised by the territorial managers. Saturday night saw most of the salesmen on their way back home.



Salesmen of the Champion Spark Plug Co. assembled at the Sales Convention at Toledo held June 9 to 15

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative

PILOTS

Dana C. DeHart
Edward V. Gardner
Eber H. Lee
John M. Miller
Leon D. Smith
Max Miller
Charles E. Bradley
Lester F. Bishop
Harold T. Lewis
Leslie E. Stancill
Charles Hugh Anglin
John H. Skoning
Earl F. White
Charles W. Lamborn
Frank H. Crozier
Walter H. Stevens

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

New York-Chicago Aerial Mail Flight Made in Eight Hours

In a trial flight of the New York-Chicago aerial mail route, one of the mail planes on June 25, covered the 745-mile distance between the two cities in eight hours, making stops at Bellefonte Park, Pa. and Cleveland, Ohio.

It is expected that four aeroplanes will be operating regularly between New York and Chicago by July 1. The aeroplanes will leave New York for the first lap of the trip each morning at five o'clock, the final aeroplane delivering the mail in Chicago at one o'clock in the afternoon of the same day.

Although for the present the aeroplanes now in service will be used, the post office authorities intend to put on much larger machines in the autumn, and expect that the excellent time made yesterday will be bettered.

It is intended that the number of aeroplanes will be materially increased as the need for them and the certainty of the service is established. Army aviators are eligible as pilots for the service, and a limited number will be taken on within a short time.

Bids for Aerial Mail in Colombia Asked By P. O. Department

Tenders are being invited by the Government of Colombia for the conveyance of mails by aeroplane, or airship between Bogota and Barranquilla, between Bogota and Pasto, and between Bogota and Cucuta; on each route there will be several landing points. The contractors will have to be responsible for the mail matter conveyed in their machines, except in cases of fortuitous mishaps, duly proved. A fine up to $5,000 is to be paid by the contractors should they fail to transport the mails by air. The first contract will be for four years, and may then be renewed from year to year. Tenders have to be sent to the Colombian Postmaster-General by next September, and it is hoped to start the services in June of next year.

John M. Miller, Formerly Naval Aviator, Piloted Aero Mail Plane Through Winter's Worst Storm

John M. Miller, now in the Aerial Mail Service, received his first aeronautic experience at the Burgess Co. of Marblehead, Mass., and later at the Sturtevant Co. of Boston. He enlisted in the Naval Air Service on May 23, 1917, and was ordered to active duty at the Massachusetts Institute of Technology Ground School. After two months here Miller received elementary flying instruction at Hampton Roads and advanced instruction



Ensign John Matthew Miller, now piloting De Haviland biplanes for the Aerial Mail Service

at Pensacola. He was commissioned on March 16 and ordered to the Rockaway Naval Air Service.

Here Miller did patrol and convoy work off New York harbor, acting as division commander for two months, then being advanced to the position of assistant squadron commander, which he continued until ordered to inactive duty on December 15, 1918.

Since entering the postal service he was stationed at Belmont Park for D. H. instruction; then he was ordered to Bustleton as station manager. While stationed here he made a trip from Philadelphia to New York in the worst winter storm recorded in some years. On May 16 he made his first flight on the Western Division between Cleveland and Chicago, which was the second flight over that route. On May 22 Miller made the first non-stop flight between Cleveland and Chicago.

Aeroplane Mail Cheaper Than Railway Mail

Washington, D. C.—In explaining the reasons for the forwarding of ordinary mail by means of aeroplanes, the Post Office stated that $62,000 has been saved over the Chicago-Cleveland route since its inception several weeks ago. The railway mail rates are based on weight and the Post Office Department has found it more economical to employ aerial mail than railway service.

Philadelphia-Atlantic City Aerial Passenger Service Starts

Atlantic City, N. J.—Inaugurating the Philadelphia-Atlantic City Air Service, James S. Clark, Assistant Secretary of the Land Title and Trust Company of Philadelphia, was the first passenger arriving at Atlantic City on June 25. Clark chose the aerial route for the shore to attend the convention of the National Association of Real Estate Boards.

Frank Mills, head of the flying school field at Essington, piloted the craft. The pair left Essington at 9:20 June 25, manoeuvered over the Land Title Building in Philadelphia and then went to Atlantic City by way of Cape May, flying against a direct head wind. They arrived at the Curtiss flying field here at 11:30 A. M.

Lincoln Aero Club Establishes Landing Field

Lincoln, Neb.—The Lincoln Aero Club has opened a landing field on a very level sixty-acre tract, donated to the Club by Mr. Mark Woods of Lincoln. Fences have been erected and parking space for 250 motor cars provided.

The citizens of Nebraska have taken an enthusiastic interest in flying. The passenger booking office on the field has attracted more business than can be taken care of. Six Curtiss planes have been delivered by the local agency and three more are on order. In this section, as throughout the country, aeroplanes are playing an important part in Fourth of July celebration plans.

Former Army Flier Goes to Commencement By Air

Middlebury, Vt.—Charles S. Jones, of Rutland, left Roosevelt Field, Mineola, L. I., in an aeroplane at ten o'clock on June 19 and landed at the Addison county fair ground here at quarter to five o'clock the next day. Jones, who won the Croix de Guerre while serving as an aviator in France, took this method of coming to attend the Middlebury College commencement. He was the leading athlete of the class of 1915 at Middlebury.

Ralph H. Mann, of Worcester, Mass., on his way to the University of Vermont commencement, accompanied Jones.

LAWSON AERIAL TRANSPORT

THE giant Lawson "C-1" biplane was designed from a strictly commercial point of view and is the first of a number of this type now being built for a trans-continental service between New York and San Francisco to be known as the Lawson Air Line.

The fuselage is built to accommodate 26 passengers and all the details of its construction and performance characteristics take into consideration the safety and comfort of the passengers. In this regard the machine possesses a high degree of inherent stability, a very flat gliding angle which is imperative in a machine of this kind, and a factor of safety which is relatively high. The machine is readily manœuvred in the air and on the ground, for the control surfaces are of such generous proportions and so well balanced that at all times control is positive. Controls may be set and locked when the course is smooth, relieving the pilot from the strain of constantly working the controls.

The seats are readily detachable and sleeping quarters installed for a fewer number of passengers when cruising for considerable distances.

The general specifications of the Lawson Air Transport "C-1" are as follows:

General Dimensions

Span, both planes	85′ 0″
Chord, both planes	9′ 6″
Gap	9′ 3″
Length overall	47′ 7″
Height overall	14′ 0″

Areas	*(sq. ft.)*
Main planes, including ailerons	1,700
Ailerons (4)	168
Stabilizers (2)	172.5
Elevators (2)	57.5
Rudders (3)	52

Angles

Incidence of main planes	3°
Dihedral	1°
Sweepback	6°
Stabilizer setting to wing chord	0°

Weights

Machine fully loaded	12,000 lbs.

Performances

Climb in 10 minutes with full load	4,000 ft.
Ceiling	15,000 ft.
Gliding angle	1 to 8
Fuel duration	5 hours
Flight duration	500 miles

Main Planes

U. S. A. 5 wing section is used. Main planes are in seven sections. The outer center section extends between the outer struts of either engine nacelle. The two lower center sections run from the fuselage to outer engine nacelle struts.

Wings have a factor of safety of 14, which is rather high when it is considered that usually the safety factor is 8. The wings are strongly braced internally and externally by cables which are double in every case. Wing struts are of wood.

Fuselage

Seats are placed at windows at each side of the body, and an aisle between the seats allows passage from the front and rear of the cabin. On the left side of the cabin forward of the wings an entrance door is provided. This door is of such proportions that the usual method of climbing or crawling into the machine is done away with.

To enter or leave the machine one of the pilots' seats is swung out of the way. All seats are of wicker construction upholstered with green leather. They are secured to the floor and provided with safety belts. The interior is finished in mahogany. The floors are covered with carpet. The depth of the body allows one to stand up without stooping when walking through.

The forward part of the body is covered with veneer and the rear of the cabin section is covered with fabric. Internally, both veneer panel struts and wiring is used for bracing. All cables are hidden from view. Longerons are of solid section ash on their forward ends, and spruce in the rear.

Controls

Dual controls are provided at the forward end of the cabin. Control wheels are 18″ in diameter and are mounted on a tube extending from one side of the body to the other. The wheels control the ailerons and elevators, and the usual foot bar is used for the rudders. All control surfaces are interconnected and cables doubled.

In the ailerons wood is used in the construction. For the stabilizers and elevators both wood and steel are used. The rudders are nearly all steel. For night flying, electric lights are supplied for the instrument board, interior of the cabin, and the wings.

Tail Group

The fuselage terminates in a steel tube stern post to which is attached a rear spar of the lower tail plane and also tail skid. The tail, of the biplane type, is adjustable to counteract any differences in balancing which may ensue. Due to the large size of the machine, passengers may move freely about the fuselage without any disturbance to plane. Rudders and elevators are of the balanced type.

Landing Gear

The landing gear is composed of two pairs of 36″ by 8″ wheels carried on large streamlined steel tube struts. They are attached under each engine in such a way as to evenly take up the landing shocks with a minimum of strain to the wings and fuselage.

Engines

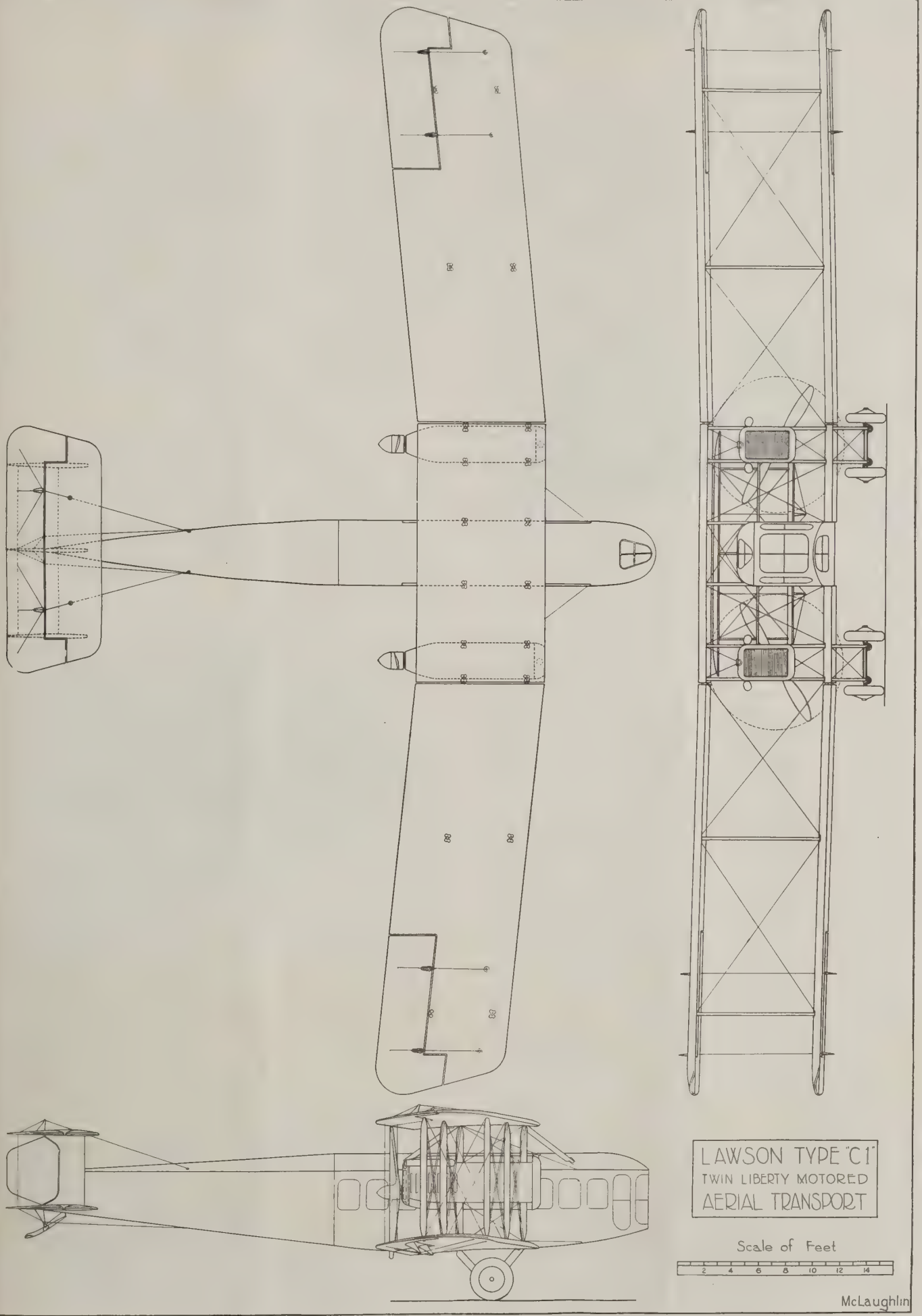
Two 12-cylinder Liberty engines are used. They are completely enclosed in nacelles at either side of the fuselage.

Front ends of nacelles are formed by the radiators. Engines are placed in pusher position with propellers 10′ in diameter revolving in opposite directions. They rest on large ash beds internally braced by steel tubes. Gas tanks are located in the nacelles. Engines are equipped with separate controls to the pilot's compartment, where they may be operated separately or together.

Effective mufflers are provided which add greatly to the comfort of the passengers.



The fuselage of the Lawson Aerial Transport is 45 ft. long, 7 ft. high and 4 ft. 9 in. wide. Provisions are made for seating 26 passengers. Two 400 H.P. Liberty motors are used

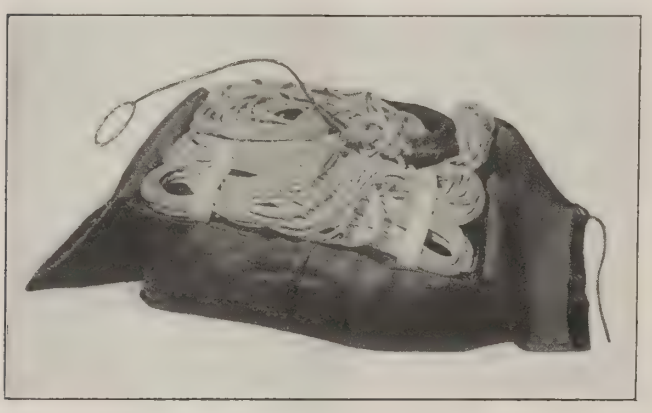

LAWSON TYPE "C1"
TWIN LIBERTY MOTORED
AERIAL TRANSPORT
Scale of Feet
2 4 6 8 10 12 14
McLaughlin

THE SPERRY PARACHUTE

By H. E. GOODMAN

A GREAT deal of interest has been aroused by my recent demonstration at the Atlantic City Airport of the Sperry parachute, and readers may find it interesting to know the details of the chute and of its operation.

The diameter of the chute is 23 feet. The descent is made at the rate of about eight miles an hour, which is the equivalent of jumping from a height of about twelve feet. The reason for the small size of the parachute is, strange as it may seem, safety. The larger the chute the greater the strain at the point of opening for a given speed, and when you cut



Harness of the Sperry Salvo Parachute

loose from a high-speed ship a large diameter makes necessary a heavier harness and connections to the parachute as well as stronger fabric throughout. When it is realized that when a jump is made the strain is around 1,200 pounds on my harness it will be appreciated that to increase this strain materially would cause discomfort and the opening would be delayed.

In coming down, I climb out of my harness, standing with one foot in the bottom loop and hanging on to the rope with one hand so that just before touching the ground I can swing free and therefore alight more easily than would be the case if the harness and chute were attached. Should there be a strong wind the parachute would be liable to drag me. Another advantage in this is that the parachute deflates the moment there is no weight attached to it.

An advantage in Sperry's design is that the aeronaut is able to get out of the machine when it is in an abnormal position, such as in a tail spin, on its back, or on one side. This cannot be done with a chute of the type installed under the fuselage, for should the machine be on its back when the jump is made the chute would be dragged over the fuselage, which would be dangerous. With that type also the jumper can get out of only one side of the aeroplane, so that should a wing come off, and he wished to jump from the opposite side of the plane, he could not do so.

A good feature of the cushion type of parachute is that it takes up no extra space in the cockpit, as it simply replaces the regular cushion of the seat. Space in the cockpit is a much needed thing, and besides when you are sitting on the chute you know it is not going to dangle out and get into trouble. I believe the cushion type is most satisfactory, because when I get out of the plane it is my whole weight that is jerking the parachute out of the container, whereas in the pack type it is only the strength of the break cord at the peak that jerks the wad of silk out.

The Sperry chute is arranged with a pig tail of twenty feet which can be attached to the aeroplane. It opens in from one to one and one-half seconds, but should you desire a delayed opening you can get this, not by attaching the rope, but by simply holding the container in your hand until you wish it to release, whereupon the air resistance will jerk the pack open. I used this delayed opening system in getting out of Stinson's plane when it was on its back, because I was afraid that Stinson might come out of his upside-down glide and strike me, because he, of course, always winds up the upside-down glide going in the opposite direction from the direction he goes when I leave the plane. Therefore, I preferred the delayed opening on that occasion, even though it seemed to worry some of the spectators on the ground.

With the type of chute that goes under the fuselage there is danger, especially in high-speed aeroplanes, of the air carrying the parachute into the tail skid, which does not occur in the cushion type, as the jumper is some distance from the aeroplane before the extension occurs.

In the demonstration made of the Sperry Salvo Chute or life-preserver, several distinctive features were brought out:

1. That only five seconds' time is required to make the installation in any plane.

2. The jump can be made from either side of the plane.

3. The jump can be made while machine is flying upside down.

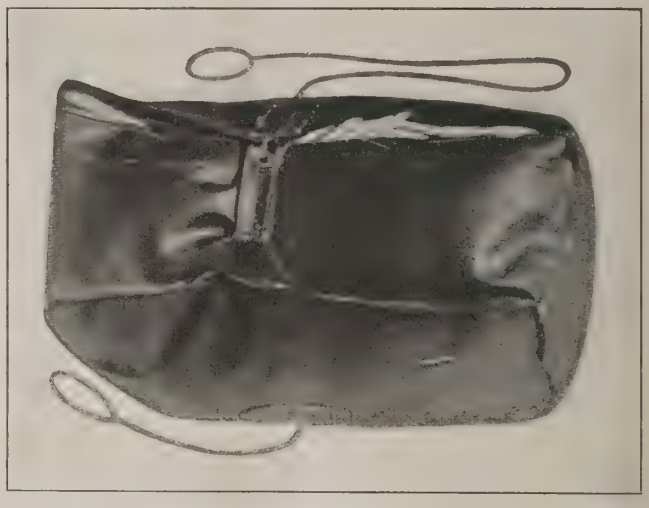
4. There is no difficulty in leaving the plane while in a tail spin.

5. The parachute, not being affected by the high rate of speed in such a way as to become entangled in any part of the aeroplane, it is possible to make the jump during a nose dive.

6. The weight of the entire life preserver equipment is in the neighborhood of 12 pounds.

7. The chute is very compact. It takes the place of the ordinary cushion in the aeroplane and is but slightly larger than such a cushion, thereby not requiring room that is not already available.

8. The harness is remarkable in its lightness (1½ pounds, total weight). It does not interfere with the aviator flying his machine and there is no likelihood of slipping out of the harness at the time that the chute opens. Due to its design, it can be worn by women with special costumes as well as



The compact arrangement of the Sperry parachute, which is used as a seat cushion

men. Its application of strain to the user is in such a way that the minimum tax results.

The device has a safety factor of 40. The harness is tested up to 4,000 pounds.

At the Atlantic City Airport special demonstrations of the Sperry parachute were made before the Contest Committee on parachutes of the Aero Club of America. It was brought out that the above-mentioned points were achieved without resort to complicated mechanism. The simple method employed to extend the parachute and the method of getting away from the slip stream of the aeroplane can be regarded as getting away from any proximity to the plane at the instant the parachute starts to extend.

In regard to the development of parachutes, I might take advantage of this opportunity to mention that Naval Constructor Hunsacker, who is in charge of the Aviation Section of the Bureau of Construction and Repair, has a parachute division in his Bureau. We consider that this division has advanced the art of parachutes for both lighter and heavier-than-air aircraft beyond any other development in this line either here or abroad.

THE GENERAL PROPERTIES AND USES OF PLYWOOD

By B. C. BOULTON, B.S., A.E.

PART II

(*Continued from page 727*)

Plywood Strength Tables

THE very large amount of data available on the strength and other properties of all the common varieties of wood when made up into plywood panels of varying thickness, number of plies, ratio of core thickness to total thickness, and combinations of species, has been collected and summarized in several tables which are reproduced herewith. The woods used in the tests from which these tables were calculated came from various parts of the country, so that slight variations due to locality are eliminated.

Column Tests: Tests to determine the column bending modulus were made on specimens 5 x 12 in. in size. In order that the panel could be computed as a round-ended column, its ends were rounded into a semicircle. The modulus is calculated by the formula $S = P/A + 6M/bd^2$, in which

S = Column bending modulus.
A = Gross area of cross section.
P = Load at maximum moment.
M = Maximum bending moment.
= Px maximum deflection.
b = Width of test piece.
d = Thickness of test piece.

Like the modulus of rupture in the ordinary bending test, the column bending modulus is not a true stress existing in the fibres at the instant of failure, because the elastic limit has been exceeded, but is rather a measure of the comparative strength of plywood in resisting external bending moments. This property includes two factors, a compressive stress and a bending stress, but the former is relatively so small that the column bending modulus can be used and treated as the modulus of rupture.



Fig. 7—Apparatus for Determining Resistance of Plywood to Splitting

In connection with the unit column loading, or P/A factor in a column test, a series of experiments were made on plywood of various thicknesses to determine whether for a given slenderness ratio the length of a plywood column had any effect on its column strength. It was found that the length had no appreciable effect for a large range of values of the ratio of the length of the column to its least radius of gyration. Fig. 3 shows a plywood column ready for this test.

Relative Splitting Resistance: In column 13 of table 1 is given the relative splitting resistance of various types of plywood, as measured by the amount of work required to split a 5 in. square test panel in the apparatus illustrated in Fig. 7. This testing device consists essentially of a sharp pointed plummet or weight that can be dropped from a given height until the test panel is split. The point of the plummet is first embedded slightly in the center of the panel; the weight is then raised to a certain height and dropped. This procedure is repeated until final failure occurs. The amount of work done is the product of the weight of the plummet and the total distance through which it has fallen.

As has been previously noted, resistance to splitting is of importance, principally in connection with the fastening of plywood along its edges by means of screws, nails or bolts. Incidentally, it is important to add that tests have demonstrated the great superiority of screws over any form of nails, a screw being more effective than a nail twice its length.

It will be noticed in table 1 that the splitting resistance of the various species is expressed as a percentage of that of yellow birch. In all the plywood tests this wood has been taken as a standard, and in table 3 certain properties of other species are also expressed as percentages of the corresponding properties of yellow birch.

Table 4 gives the results of tests made to determine the effect of using panels of more than three-plies. The various factors entering into this type of construction have already been discussed. In table 2 are listed the tensile strengths of single-ply and three-ply veneer of various species. Table 3 gives the thickness of a sheet of veneer of any species of wood that will have the same weight as a unit thickness of yellow birch veneer, information of considerable interest to designers. It should be noted that in this table only the relative densities of the woods themselves were considered in computing the thickness factor, and not the densities of glued-up panels. Hence, no account is taken of variations in the amount of glue that different species of wood will absorb. This, as a rule, is greater for open-grained woods than for heavy, dense woods, such as maple and birch. The thickness of any panel that shall have the same strength in bending as a yellow birch panel can be calculated from the thickness factors found in column 6 of table 3. These factors were obtained as follows:

$$M_1 = \frac{S_1 b d_1^2}{6} = M_2 = \frac{S_2 b d_2^2}{6} \quad \therefore d_2 = d_1 \sqrt{\frac{S_1}{S_2}}$$

If d_1 is taken as unity, S_1, the strength of yellow birch in bending, as 100, and S_2 as a percentage of S_1, the thickness factor, $K_s = \sqrt{\frac{100}{S_2}}$, and $d_2 = d_1 K_s$. It should be emphasized that the ratio of core to total thickness must be same for both the birch panel and the one for which the calculation is being made. Also, differences in the number of plies and in the total thickness of the proposed panel may affect this relation somewhat.

In table 5 are given the weights in ounces per square foot of different thicknesses of various species of wood used in aeroplane construction. Using the value for the weight per square foot for a single layer of glue, the total weight of a plywood panel of any thickness, number of plies, or combination of woods can be readily calculated. The results will be as accurate as normal variations in the density of any one species will permit. Here again, however, a slight error is introduced by neglecting variations in the amount of glue absorbed by different woods.

All the tables reproduced in this article were prepared by the Forest Products Laboratory for the Bureau of Aircraft Production. The photographs also were taken in connection with their testing.

TABLE 1

TENTATIVE TABLE OF STRENGTHS OF VARIOUS SPECIES OF 3-PLY PANELS

All plywood was 3 ply with the grain of successive plies at right angles.
All plies in any one panel were of the same thickness and of the same species. Eight thicknesses of plywood ranging from 3/30" to 3/6" were tested.

Species	Av. Sp. Gravity of Ply-†wood	Av. percent Moist-ure	Column Bending Modulus				Tensile Strength				Split. Resistance		Modulus of Elas'c'ty	
			*Parallel		*Perpendicular		*Parallel		*Perpendicular				*Parallel	*Perpend.
			No. of Tests	Lbs. per sq. in.	No. of Tests	Lbs. per sq. in.	No. of Tests	Lbs. per sq. in.	No. of Tests	Lbs. per sq. in.	No. of Tests	Percent of Birch resist-ance	Lbs. per sq. in. in Bend'g	Lbs. per sq. in. in Bend'g
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Birch, Yellow	.67	8.5	195	16,000	200	3,200	200	13,200	200	7,700	400	100	2,259,000	197,000
Ash, Black	.48	9.2	80	7,360	80	1,620	80	6,200	80	3,940	160	68	1,028,000	87,000
Ash, Commercial White	.61	10.6	160	9,980	160	2,640	160	6,540	160	4,330	320	72	1,422,000	144,000
Basswood	.41	9.6	160	6,520	160	1,540	160	6,300	160	4,100	320	65	1,213,000	85,000
Beech	.67	8.6	120	15,390	120	2,950	120	13,000	120	7,260	240	76	2,149,000	167,000
Cedar, Spanish	.41	13.3	115	6,460	115	1,480	115	5,200	115	3,340	230	60	1,032,000	84,000
Cherry	.49	9.9	40	11,180	40	2,220	40	6,920	40	5,650	80	86	1,448,000	150,000
Chestnut	.43	11.7	40	5,160	40	1,110	40	4,430	40	2,600	80	74	744,300	75,000
Cottonwood	.48	9.5	40	8,110	40	1,660	40	7,540	40	4,500	80	94	1,461,000	110,000
Douglas Fir	.45	8.4	105	8,890	110	1,730	110	5,630	110	3,530	220	59	1,316,000	129,000
Elm, Cork	.59	11.7	35	10,530	35	2,160	35	9,840	35	6,040	70	100	1,729,000	125,000
Elm, White	.53	8.9	120	8,810	120	1,990	120	6,460	120	4,190	240	85	1,230,000	112,000
Gum, Red	.54	8.5	102	9,330	102	1,830	102	7,780	102	4,890	204	68	1,487,000	107,000
Gum, Cotton	.49	10.3	80	7,770	80	1,580	80	6,260	80	3,770	160	60	1,300,000	111,000
Gum, Black	.54	10.6	40	8,090	40	1,920	35	6,960	35	4,320	70	55	1,275,000	113,000
Hackberry	.54	10.9	40	8,380	40	1,720	40	7,870	40	4,550	80	85	1,257,000	111,000
Hemlock	.49	9.2	40	9,520	40	2,120	40	7,490	40	4,740	80	65	1,614,000	120,000
Maple, Soft	.60	9.0	80	11,750	80	2,430	80	8,020	80	5,470	160	114	1,822,000	147,000
Maple, Hard	.68	7.6	82	15,870	82	3,320	82	11,610	82	7,060	164	124	2,009,000	186,000
Mahogany, True	.48	11.4	35	8,500	35	1,940	35	6,390	35	3,780	.....	.....	1,252,000	117,000
Mahogany, African	.52	12.7	20	8,070	20	2,000	20	5,370	20	3,770	.....	.....	1,261,000	144,000
Mahogany, Philippine	.53	10.7	25	10,160	25	2,310	25	10,670	25	5,990	50	90	1,820,000	169,000
Magnolia	.59	9.9	40	9,830	40	2,340	40	10,000	40	5,740	80	98	1,704,000	135,000
Oak, White	.64	10.1	75	9,440	75	1,920	75	7,260	75	3,950	150	90	1,085,000	106,000
Oak, Red	.59	9.3	115	8,500	115	2,070	115	5,480	115	3,610	230	80	1,289,000	120,000
Pine, White	.43	10.2	35	7,920	40	1,770	40	5,640	40	3,870	80	52	1,274,000	99,000
Poplar, Yellow	.50	9.0	120	8,900	120	1,920	110	7,380	120	4,520	240	52	1,501,000	114,000
Redwood	.41	11.2	65	7,900	65	1,500	65	5,100	65	3,000	130	48	1,211,000	118,000
Sycamore	.56	10.0	80	10,920	80	2,390	80	8,840	80	5,480	160	79	1,642,000	135,000
Spruce, Sitka	.41	8.0	63	7,280	63	1,540	63	5,180	63	3,150	126	75	1,176,000	98,000
Walnut, Black	.58	9.7	80	11,850	80	2,660	80	7,640	80	5,100	160	77	1,664,000	144,000

*Parallel and perpendicular refer to the direction of the grain of the faces relative to the direction of the application of the force.
†Sp. Gravity based on oven dry weight and volume at test.

Design of Various Aeroplane Parts of Plywood

Wing Ribs: Tests have demonstrated that for chord lengths up to 75 in., which, with an R. A. F. 15 section, would give a maximum depth of about 4½ in., the type of construction which employs spruce cap strips, and a plywood web, suitably lightened by holes, is fully as efficient and strong as any built-up or trussed rib, and in addition is more reliable and easier to construct than these types. That there is a limit, however, beyond which the trussed construction is superior to the plywood, is obvious, but only more extended experimentation can determine what this limit is. In the webs of plywood ribs two types of cutouts are used, the circular and the elongate; the latter may be oval or often nearly rectangular, with a length two or three times its depth. Since the vertical members of the web serve to carry compression and horizontal shear, and to prevent buckling of the web as a whole, it is usually best to have the grain of the face plies vertical. This is an illustration of the principle that the grain of the outside plies should be in the direction of a column load. Furthermore, as a function of the web is to act with the flange or capstrip in carrying both compression and bending, it is best to have the core, in which the grain runs parallel to the capstrip, form a large proportion of the total web. Where low density woods are used in both the faces and core, the ratio of core to total thickness should be about 1 to 2; and where high density faces are used with a low density core this ratio may increase to 2 to 3. Among the light woods, Spanish cedar has proved most satisfactory for rib construction; while in the heavier species, combinations of yellow birch or maple faces with basswood or poplar cores are most suitable. Within the range of chord lengths which have been tested the following thicknesses have been found to give good results: For Spanish cedar throughout, 1/40 in. faces and 1/16 in. core; for birch outside plies and poplar core, 1/55 in. faces and 1/13 in. core.

Fuselage Skin: Plywood in fuselage construction may be used merely as covering, or as reinforcement for a truss that is designed to carry either the entire load or a large portion of it. Or, if the fuselage is of the all-veneer type, the plywood shell itself, strengthened by the longerons, carries all the load.

When plywood is used in conjunction with a fuselage truss it is important that it should not wrinkle or buckle. This tendency is more pronounced when the plywood has to lie flat than when it is curved. To decrease wrinkling or similar distortion, the core of the plywood is made relatively thick, and of a low density wood like poplar or basswood, while the face plies are of thin mahogany or birch. In the first application of plywood to fuselage trusses it served merely as a covering to replace linen. Any strengthening it afforded was incidental and was neglected in computing the longerons and wires of the truss. This was of course uneconomical. In later designs the plywood was made slightly heavier and stiffer, and could therefore be depended upon to carry shear stresses, to afford lateral support to compression members, and to bind together and stiffen the entire truss. It was found

TABLE 2

TENSILE STRENGTH OF PLYWOOD AND VENEER

Species	No. of Tests	Moisture at Test — %	*Sp. Gravity of plywood	†Tensile Str. of 3-ply wood parallel to grain of faces Lbs. per sq. in.	¶Tensile Str. of single ply veneer—1½ (d) Lbs. per sq. in.
	(a)	(b)	(c)	(d)	(e)
Birch	200	8.5	.67	13,240	19,860
Ash, Black	80	9.1	.57	6,200	9,300
Ash, Commercial White	120	10.5	.61	6,700	10,050
Basswood	160	9.6	.41	6,300	9,450
Beech	120	8.6	.67	13,000	19,500
Cedar, Spanish	80	11.8	.43	5,220	7,830
Cherry	40	9.9	.49	6,920	10,380
Chestnut	40	11.7	.43	4,430	6,640
Cottonwood	40	9.5	.48	7,540	11,310
Douglas Fir	110	8.4	.45	5,630	8,440
Elm, Cork	35	11.7	.59	9,840	14,760
Elm, White	120	8.9	.53	6,460	9,690
Gum, Red	102	8.5	.54	7,780	11,670
Gum, Cotton	80	10.3	.49	6,260	9,390
Maple, Soft	80	9.0	.60	8,020	12,030
Maple, Sugar	82	7.6	.68	11,610	17,420
Oak, Red	115	9.3	.59	5,480	8,220
Oak, White	75	10.1	.64	7,260	10,890
Poplar, Yellow	80	8.8	.50	7,130	10,690
Redwood	65	11.2	.41	5,100	7,650
Sycamore	40	10.2	.56	9,180	13,770
Spruce, Sitka	40	7.9	.41	4,900	7,350
Walnut, Black	80	9.7	.58	7,640	11,460
Pine, White	40	10.2	.43	5,640	8,460
Mahogany, Philippine	25	10.7	.53	10,670	16,000
Mahogany, True	35	11.4	.47	6,380	9,570
Mahogany, African	20	12.7	.52	5,370	8,060

*Specific gravity based on oven dry weight and volume at test.
†Based on total cross sectional area.
¶Based on assumption that center ply carries no load.
Data based on tests of three ply panels with all plies in any one panel same thickness and species.

TABLE 3

THICKNESS FACTORS FOR VENEER

Giving:

(a) Veneer thickness for same total bending strength as birch.
(b) Veneer thickness for same weight as birch.

Species	G* Av. Sp. Gravity of species from Bulletin 556 and other sources.	Specific Gravity of glued plywood as tested.*	Percent Moisture of plywood as tested.	S Unit bending strength compared with birch average of Cols. 5 and 7, Table 1 in percent of Birch.	Ks Thickness factor for the same total bending strgth. as Birch. $\sqrt{\frac{100}{S}}$	Kw Thickness factor for the same weight as birch. $\frac{63}{G}$
1	2	3	4	5	6	7
Birch, Yellow	.63	.67	8.5	100	1.00	1.00
Ash, Black	.50	.48	9.2	47	1.46	1.26
Ash, Commercial White	.58	.61	10.6	66	1.23	1.09
Basswood	.38	.41	9.6	42	1.54	1.66
Beech	.63	.67	8.6	96	1.02	1.00
Cedar, Spanish	.34	.41	13.3	41	1.56	1.85
Cherry	.51	.49	9.9	70	1.19	1.24
Chestnut	.44	.43	11.7	33	1.74	1.43
Cottonwood	.43	.48	9.5	51	1.40	1.47
Douglas Fir	.44	.45	8.4	55	1.35	1.43
Elm, Cork	.66	.59	11.7	68	1.23	.95
Elm, White	.51	.53	8.9	56	1.33	1.24
Gum, Red	.49	.54	8.5	58	1.31	1.29
Gum, Cotton	.52	.49	10.3	49	1.43	1.21
Gum, Black	.52	.54	10.6	52	1.38	1.21
Hackberry	.54	.54	10.9	53	1.37	1.17
Hemlock	.42	.49	9.2	61	1.28	1.50
Maple, Soft	.48	.60	9.0	74	1.16	1.31
Maple, Hard	.62	.68	7.6	100	1.00	1.02
Mahogany, True	.49	.48	11.4	54	1.36	1.29
Mahogany, African	.46	.52	12.7	53	1.37	1.37
Mahogany, Philippine	.57	.53	10.7	65	1.24	1.11
Magnolia	.51	.59	9.9	63	1.26	1.24
Oak, White	.69	.64	10.1	59	1.30	.91
Oak, Red	.63	.59	9.3	55	1.35	1.00
Pine, White	.39	.43	10.2	50	1.41	1.62
Poplar, Yellow	.41	.55	9.0	56	1.33	1.54
Redwood	.36	.41	11.2	49	1.43	1.75
Sycamore	.50	.56	10.0	69	1.20	1.26
Spruce, Sitka	.38	.41	8.0	46	1.47	1.66
Walnut, Black	.57	.58	10.2	76	1.15	1.11

*Specific gravity based on oven-dry weight and volume at test.

that all diagonal bracing wires could be omitted and the size of the longerons considerably decreased. The use of diagonal struts, running from the lower longeron at the points of attachment of the chassis struts and flying wires, to distribute the stresses from these members to several points on the upper longeron, is advisable. The ease with which a fuselage of this character can be built, together with its comparative lightness, makes it a close competitor of the newer, all-veneer body.

One of the chief advantages of the latter type is its high aerodynamic efficiency due to the excellent streamlining that can be obtained, and to the fact that changes in the attitude of a plane do not sensibly increase the resistance of such a faired body. In the veneer fuselage, the skin resists all the vertical and horizontal shear, and together with the longerons, it carries the bending moment produced by air loads on the tail surfaces or by dynamic loads. This second function determines that the grain of the face plies shall be longitudinal with respect to the axis of the body, and that of the core, transverse.

Spruce plywood because of its lightness and stiffness has given excellent results, particularly in designs of fairly good depth and moderate length. But for the fuselages of larger, heavier planes, especially those which are relatively shallow or unusually long, a stronger wood such as elm or birch is better. In many instances a combination of elm faces and basswood core is most suitable.

Since the bending moment increases rapidly forward of the rear cockpit, it has been found economical to use more plies in the part of the fuselage extending from just aft of the rear cockpit forward to about the center of the engine section, than in the rear portion of the body. In a comparatively heavy fuselage, for example, this rear section is usually of three-ply veneer and the critical section forward of the rear cockpit, of five-ply. The purpose of the heavy construction near the engine section is to resist the great shearing stresses produced by the engine and fuel tanks. Where the outer plies become unnecessary they taper down to a feather edge. For smaller bodies the skin is three-ply at the critical section, and toward the rear two-ply. In this case fabric often is used between the plies because of the greater toughness and stiffness that it imparts to the skin.

With this general type of fuselage the skin is divided into four longitudinal sections, the top, bottom, and sides. These sections may in turn be spliced transversely at one or more points. The chief function of the top and bottom portions of the skin is to resist bending moment, that of the side sections, to resist shearing stresses. The longitudinal sections join at the longerons to which the plywood is glued, and screwed or nailed. A scarf joint is considered superior to a butt joint, largely because it stands weathering better. In making transverse splices in the plywood it is the best practice to employ a long, glued scarf joint having a slope of approximately 1 to 25, which with 3/32 in. plywood, for example, forms a lap of about 2½ in. Such a joint would usually be made at a bulkhead. Figure 8 shows both longitudinal and transverse splices.

(To be continued.)

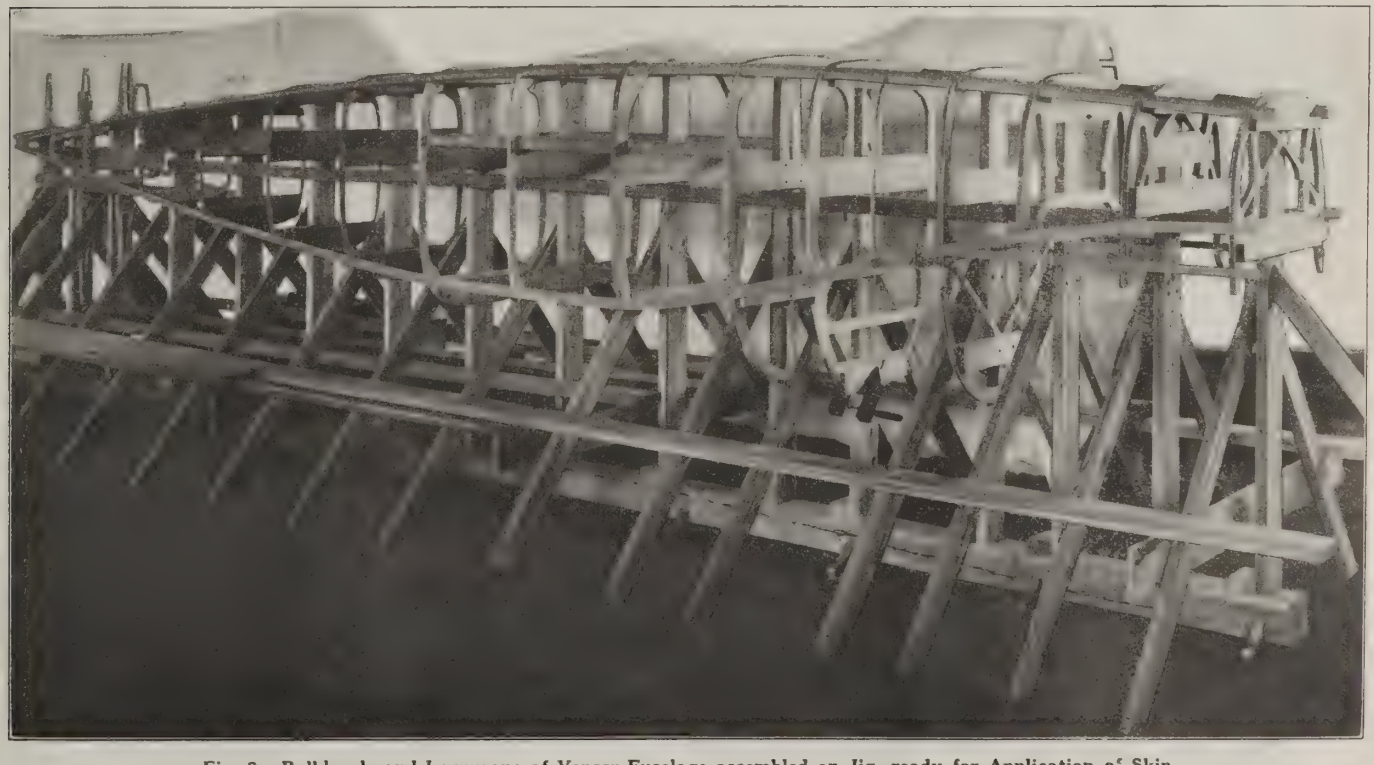
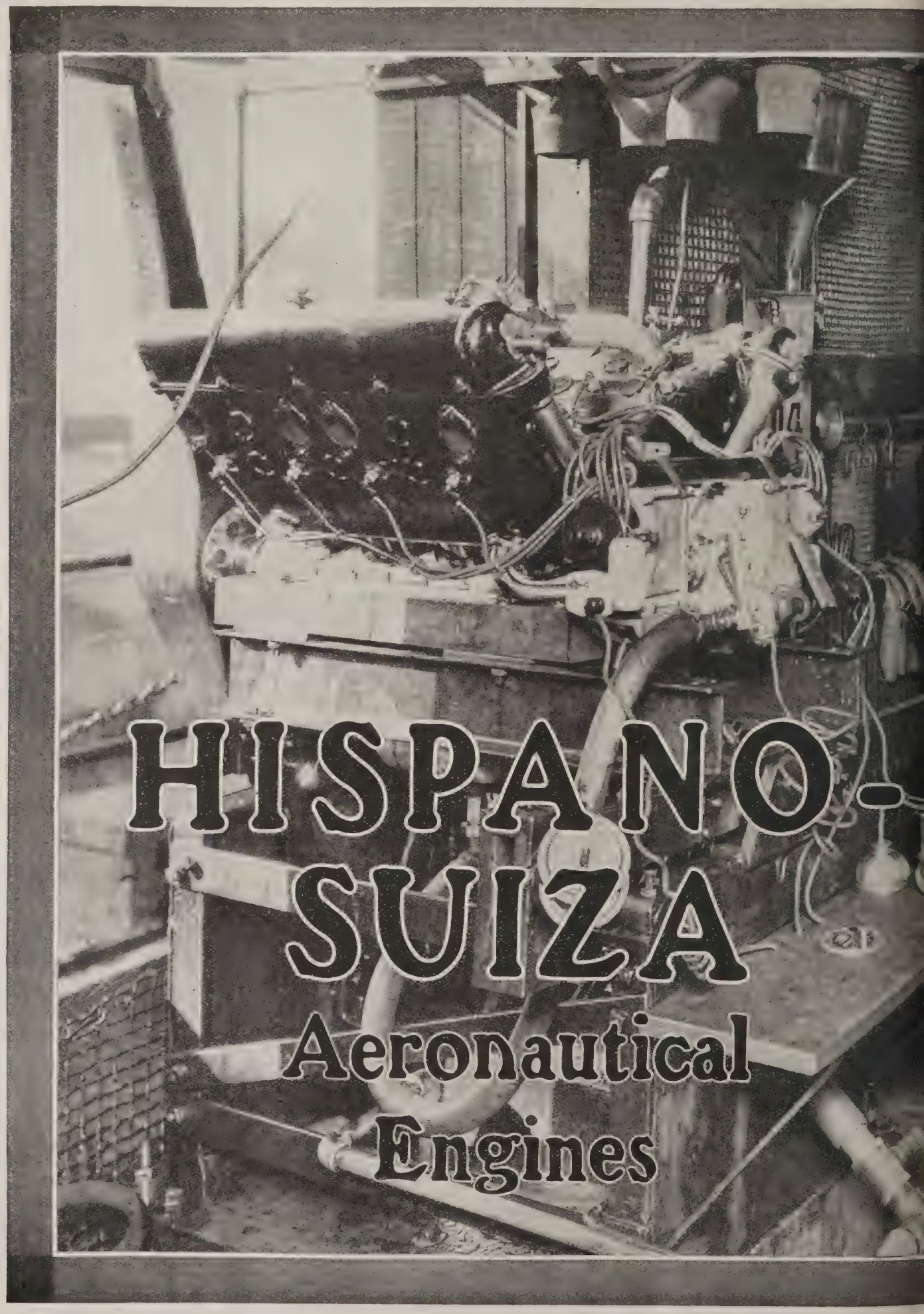


Fig. 8. Bulkheads and Longerons of Veneer Fuselage assembled on Jig, ready for Application of Skin


HISPANO-
SUIZA
Aeronautical
Engines



Battery of Hispano-Suiza Aeronautical Engines in final test under Government Inspection.

"The Motor that made the Spad possible"

IT is significant that these Government tests are even less exacting than the tests given Hispano-Suiza Aeronautical Engines by this Organization.

It is this policy—a standard higher than is governmentally necessary—which accounts for the remarkable record of this great engine.

Wright-Martin Aircraft Corporation

New Brunswick, N. J.

NAVAL and MILITARY AERONAUTICS

Army Aviators in Cross Country Flight

Flying from Globe, Arizona, to Phoenix, Arizona, in a De Haviland 4 Lieutenant Wilbur Wright, pilot, with Captain J. T. Darrow, passenger, at an elevation of 7,000 feet passed over the Roosevelt dam and covered the distance between the two points 110 miles in 52 minutes. Topography of the country is exceedingly rough and mountainous.

Lieutenant Henry E. Wooldredge in a De Haviland 4 flew from Ellington Field, Houston, Texas, to Kelly Field, San Antonio, Texas, at a maximum elevation of 8,000 feet, a distance of 210 miles in 95 minutes. Returning in order to pass away from heavy thunder storms he rose to an elevation of 12,000 feet, made a considerable detour to escape the storms and vivid lightning, making the distance of 210 miles exclusive of the detours in 150 minutes.

Lieutenant A. T. Steele carried an Air Service recruit from Birmingham, Ala., back to his station at Montgomery in a De Haviland. The distance of 206 miles was covered in 93 minutes on a speed of 132 miles an hour.

Lieutenant R. S. Worthington on June 17 made what is believed to be a record for an SE-5 single-seater scout by covering the 500 mile distance between Palo Alto and San Diego in 260 minutes, an average speed of 115 miles per hour.

Naval Aviation Officers Get the Legion of Honor

Washington, D. C.—The French Government has decorated more than a score of American naval officers, among them the retiring Commander in Chief of the Atlantic Fleet and some of the higher ranking officers who served in important capacities under Admirals Sims, Wilson and Rodman in European waters, with the order of the Legion of Honor. Among the other officers to be so honored were Lieut. G. J. Romulus, who was at the naval air station at Brest; Lieut. R. E. Read, U. S. N. R. F., who was at naval aviation headquarters in Paris; Ensign E. G. Rose, U. S. N. R. F., and Ensign H. G. Campbell, U. S. N. R. F., who was at the naval aviation station at Brest.

19,000 Hours Flown by Air Service Cadets in Six Weeks

Washington, D. C.—According to a report from the Air Service, from April 3 to June 12, there were over 19,000 hours flown in training of air service cadets. There were eight fatalities in this period, or one for each 2,380 hours of flying.

War Department Turns Over Hispano-Suiza Motors to Navy

Washington.—The Air Service has transferred to the Navy Department 50 300 H.P. Hispano-Suiza engines and spare parts for replacement, according to an announcement of the War Department. The Navy Department acquired the engines and parts at their actual cost to the War Department, which was $227,000. These engines were purchased by the War Department to equip bombing planes.

Colonel Chandler Made Officer of the Legion of Honor

Washington, D. C.—General Collardet, Military Attache, French Embassy, announces that the Government of the French Republic has conferred upon Col. C. de F. Chandler, Chief Balloon and Airship Division, Air Service, the rank of Officer of the Legion of Honor in recognition of the meritorious services rendered by Col. Chandler as chief of the American balloon service in France.

Air Service Fields May Be Used by Civilian Fliers

Washington, D. C.—The following statement has been issued by the Director of the Air Service regarding the employment of Air Service planes and landing fields:

I. 1. Flights in aircraft under the control of the Air Service are authorized for all training or war purposes and such other purposes as are here set forth:

(a) For the proper execution of any approved project of the Air Service or of the Air Service in co-operation with any other branch of the service or department of the Government—special approval of this office to be secured in each case.

(b) For the demonstration of aircraft and aircraft development to officers of the Executive, Legislative and Judicial branches of the Government.

(c) For the rapid transportation of military or civilian officials of the Government, of messages or parcels in cases of urgent necessity and for the convenience of the Government.

(d) For the assistance of stranded civilian aviators or where it is necessary for the saving of human life.

2. The following may be carried as passengers in aircraft under the control of the Air Service:

(a) Any person necessary to be carried as a passenger to accomplish the purpose of any of the flights authorized in Paragraph No. 1, above.

(b) Officers and enlisted men of the Army, Navy and Marine Corps, both active and reserve.

(c) Officers and enlisted men of foreign armies, as a courtesy when they are visiting the United States.

3. No person will be permitted to pilot aircraft under the control of the Air Service except regularly authorized Air Service pilots or bona fide student-pilots of the Air Service.

II. 1. Persons operating aircraft who are not in the military service or who are not under the jurisdiction of the Air Service, will be permitted to use government facilities at Air Service stations contingent upon their proper observance of the air and ground rules in force at the particular station in question, and subject to the discretion of the Commanding Officer thereof as not interfering with the proper conduct of official business of his station, as follows:

(a) They may be permitted to land and



© International Film Service

The Martin Bomber, which will attempt a trans-continental flight with but one stop, undergoing tests at the Army aviation field at Dayton

take-off from Flying Fields.

(b) They may be permitted to place aeroplanes in government hangars over night or for a short time pending repairs.

2. The sale of gasoline, oil, spare parts, etc., or the furnishing of the labor of Air Service mechanics in any form to pilots not in the military service is forbidden.

Demobilization of Air Service

Washington, D. C.—According to reports received from the Air Service the net decrease in the total commissioned and enlisted strength from the date of the armistice to June 12 was 82 per cent.

The following table shows the present distribution of personnel as compared with the figures of November 11, and per cent. decrease. The June 12 figures do not include 417 officers and 2,320 enlisted men in transit to or at demobilization camps awaiting discharge.

	Nov. 11	June 12	Per cent. net decrease
Cadets	6,483	101	98
Enlisted men	170,436	30,237	82
Officers	20,852	4,720	77
Total	197,771	35,058	82

During the week ended June 12, 1919, the decrease in the Air Service personnel overseas was 1,845 as against a weekly average of 1,343 for the four preceding weeks.

The strength of the Air Service in the U. S. and overseas on November 11, January 30, and June 12 is shown in the following diagram:

	U. S.	Overseas
Nov. 11.....	119,882	77,889
Jan. 30.....	46,919	57,527
June 12.....	13,558	21,500

1,351 Discharged Flying Officers Enter Reserve

Washington, D. C.—From the date of the armistice to June 7, 1919, the number of Air Service officers discharged was 14,292; of these 2,530, or 18 per cent. accepted commissions in the Reserve. Following is a comparison of flying and non-flying officers discharged and re-commissioned in the Reserve:

	Number discharged	Accepted Reserve commis'ns	Per cent. accepted Reserve commissions
Non-flying officers	5,654	1,179	21
Flying officers	8,638	1,351	16

Air Service At Sixty Per Cent. of Authorized Strength in Avance Zone

Washington, D. C.—For the week ended May 21, 1919, the Air Service strength in planes operating in the Zone of Advance was 60 per cent. of the authorized strength. Of the planes on hand 65 per cent. were available for service.

In the following diagram is shown a comparison of planes "on hand" and "available" in the Zone of Advance:

	Pursuit	Observation	Total
Authorized strength	25	96	121
Planes on hand....	27	45	72
Planes available....	16	31	47

Special Orders Nos. 139 to 143 Inc.

Second Lieut. Aubrey W. Schofield is transferred to the military hospital, Cooperstown, N. Y., for further observation and treatment.

Second Lieut. Charles H. Dowman is transferred to General Hospital No. 28, Fort Sheridan, Ill., for further observation and treatment.

Capt. John D. Jones will proceed to Washington, D. C., on temporary duty, not to exceed five days, for the purpose of a conference; thence to Hazelhurst Field, Mineola, Long Island, N. Y.



Lieut. Brack-Papa (on left) and Capt. Guido, who will attempt the trans-Atlantic flight in a speedy Fiat biplane

Capt. Harold M. Gallop is relieved from further duty at Hazelhurst Field, Mineola, Long Island, N. Y., and will proceed from Washington, D. C., to Langley Field, Hampton, Va.

Second Lieut. Glen Eyre Wood will proceed to Langley Field, Hampton, Va.

Second Lieut. Herbert E. Metcalf will proceed to Washington, D. C., and report in person to the Director of Air Service for duty.

Capt. Paul P. Robinson will proceed to Carruthers Field, Benbrook, Texas.

Second Lieut. Bernard B. Robinson will proceed to Langley Field, Hampton, Va.

First Lieut. Robert J. Kennedy is relieved from further duty in the Office of the Director of Finance, Washington, D. C., and will proceed to Philadelphia, Pa., and report in person to the zone finance officer for assignment to duty as assistant to the zone property auditor.

Second Lieut. Freeman Albery will proceed to Dayton, Ohio, and report in person to the Chief Engineering Division, Air Service, for duty.

Second Lieut. Thaddeus W. Shackleford will proceed from Camp Little Rock, Ark., to Selfridge Field, Mount Clemens, Mich.

Upon receipt of proper clearances, Cap. Arthur Gosling, Air Service is relieved from his present duties at the Air Service Mechanics School, St. Paul, Minn., and will proceed to Fort Snelling, Minn., for discharge.

The following-named officers are relieved from their present duties and will proceed to the stations indicated: Capt. Guy W. Arnold to Aviation General Supply Depot, Middletown, Pa.; Second Lieut. Michael J. Hurley to Aviation Repair Depot, Speedway, Indianapolis, Ind. and Second Lieut. William J. Tuttle to Taliaferro Field, Hicks, Texas.

Second Lieut. Merle R. Husted is relieved from observation and treatment at the General Hospital No. 2, Fort McHenry, Md., and will proceed to Garden City, Long Island, N. Y., and report in person to the commanding officer, Air Service Depot, that place, pursuant to provisions of Circular Letter 57, S. G. O., 1919.

Second Lieut. Stacey C. Hinkle will proceed to Mineola, Long Island, N. Y., and report in person to the commanding officer, Hazelhurst Field for assignment to duty with the 3d Aero Squadron.

Capt. William H. Smith will proceed with the least practicable delay to Camp Owenbierne, Texas, and report to the commanding officer for discharge, under the provisions of Circular 75, War Department, 1918.

First Lieut. Carl E. Royer is relieved from his present duties, and will proceed from Ross Field, Arcadia, Cal., to Hazelhurst Field, Mineola, Long Island, N. Y.

First Lieut. Albert C. Adams, unassigned, now at Mitchel Field, Long Island, N. Y., is transferred to United States Army General Hospital No. 43, Hampton, Va., for further observation and treatment.

Second Lieut. Robert Leroy Warfield is announced as on duty requiring him to participate regularly and frequently in aerial flights from November 4, 1918, to December 9, 1918.

First Lieut. John F. Proctor is relieved from his present duties, and will proceed to Rockwell Field, San Diego, Cal., and report in person to the commanding officer for assignment to duty with the 2d Aero Squadron.

First Lieut. Carl L. Kohlmeier is announced as being on duty requiring him to participate regularly and frequently in aerial flights from April 1, 1918 to July 4, 1918.

Second Lieut. Sefus Sutton, Air Service, is relieved from his present assignment and duty, and will proceed to Camp Dix, N. J., and report to the commanding general for assignment to duty.

First Lieut. Roy Robinson is announced on

(*Continued on page* 825)



© Keystone View Co.

The Australian aviators who will attempt the England to Australia flight in a Blackburn "Kangaroo". From left to right: Lieut. Maddock, engineer; Lieut. Kingston Smith, pilot, and Lieut. Rendle, navigator

FOREIGN NEWS

Bossoutrob, French Aviator, Tests Smallest Plane in Existence

A French aviator, Bossoutrob, has made successful experiments with the smallest aeroplane in existence, known as the "mosquito." It has a 20 h.p. engine, and measures 4 yards between the wing tips. It flew for an hour at an altitude of 5,000 feet.

Gathergood Wins London Aerial Derby

London.—The London Aerial Derby, held on June 21, was won by Capt. Gathergood, who made the flight of two circuits of London, aggregating 190 miles in 87 minutes and 45 seconds. His average speed was 140 miles an hour. The best previous time was made by Hamelin in 1913, when he made an average speed of 76 miles an hour. The race has not been contested since 1914.

Captain Gathergood is an experienced pilot, and has made a record in testing machines, having flown, it is said, 87 different types of aeroplanes.

The turning-points and the distances round the course are as follows:

Turning points	Distance From Start. Miles.	Distance From Last Point. Miles.
1. Kempton Park (Waterworks north of railway station)	14	—
2. Epsom (Grand Stand on Race Course)	24	10
3. West Thurrock (Wouldham Cement Works, tall factory chimneys and large shed)	50¼	26¼
4. Epping (Parish Church)	67¾	17½
5. Hertford (large White Cross in Field adjoining railway station, north of town)	78½	10¾
6. The London Aerodrome, Hendon (Starting, *Passing Over* on first circuit, and Finishing at No. 1 Pylon)	94½	16

Aerial Mails to Greece

It has been announced in Athens that the Italian government has informed the Greek government that it will start giving effect to the convention recently signed between the two countries for air mail service. Two aerodromes are to be established, the one at Corfu, the other at Brindisi.

Aerial Defenses of Panama Canal Zone Being Strengthened

The importance of the aerial defenses of the Panama Canal has led to increased construction at France Field. The natural conditions of the terrain in the Canal Zone are decidedly unfavorable to the use of land machines, the heavily wooded and hilly surface of the land makes landings most hazardous.

France Field has been in existence since April, 1918. It is filled in marsh land and has facilities for housing both land and sea planes More hangars and quarters are under construction and room is being made for increased personnel and equipment.

The only Army Aero Squadron on the Zone at the present time, is the 7th Aero Squadron. It is an observation unit consisting, at the time of writing, of but one flight of six De Haviland planes. Before long however flights B and C will be in operation as soon as personnel and material are available. Flight A consists of Lieut. R. V. Blessley, flight commander; Capt. H. W. Holden, senior observer; pilots, Lieuts. S. M. Connel, J. G. Williams, R. D. Knapp, T. A. McArn, W. B. Souza; observers, Lieuts. D. D. Watson, J. E. McCabe, F. N. Stratton, J. F. Whiteley, and M. D. Adams. Both pilots and observers have all had considerable experience in the Air Service having been developed with the development of the Air Service itself. Many have been overseas from three months to a year. Several were attached to the French and British armies.

Single-motored Plane Long Distance Record Held by French

Cables from France announce that the recent non-stop flight made by the French aviators Roget and Coli from Paris to Rabat, Morocco, a distance of 1,116 miles, constitutes a world's record for a single-motored plane, their machine being driven by one 300-horsepower Renault aviation engine. The flight in question was intended as the initial jump of a trans-Atlantic flight, with scheduled stops at Dakar, West Africa, and St. Paul Rocks in the Virgin Island group, and the terminal some point on the Brazilian Coast of South America. In a forced landing near Rabat for fuel rough ground was encountered, the machine wrecked, and the aviators slightly injured.

Handley Page to Operate Buenos Aires-Pernambuco Service

The Handley Page Co., London, England, has secured concessions to operate aeroplanes in Brazil. The concession is for ten years but does not give exclusive monopolies on privileges. It further provides that within two years the Government may demand that the pilots be Brazilian citizens, and that the machines must be registered with the Inspector of Navigation.

The Handley Page Co. will inaugurate an aerial line between Buenos Aires and Pernambuco and will use machines of 3,000 h.p. and capable of transporting 7,700 lbs., at an average speed of 112 kilometers per hour. It is expected that the voyage between Buenos Aires and Pernambuco will be made in three days with stope at Porto Alegre and Rio de Janeiro. The planes will travel by day only and the passenegrs will stop at night in hotels to be operated by the company. It is expected the service will start within six months. The airships will have a capacity for 12 passengers, with baggage, and one ton of freight.

Chair of Aeronautics at London University

London.—It is announced that a chair of aeronautics has been instituted at London University. It is understood that several of the older universities are contemplating the establishment of a curriculum for aeronautical engineering students, but it remained for London University to initiate the first regular course of study.

Amsterdam Exposition Postponed to August 1st

With further reference to the First Aeronautical Exposition at Amsterdam, which was to have been held during the month of July, and perhaps August, a cable has just been received from Holland stating that this exposition will be held instead, starting August 1, and close some time in September. The cable also states that German participation is excluded and a large English and French participation is expected. It is hoped that America will not remain behind in its exhibits.

The Austin "Greyhound" Aeroplane

The Austin "Greyhound" is equipped with a nine-cylinder A. B. C. radial engine of 320 h.p. The modification of average practice chiefly noticeable is the difference in size between the upper and lower planes. The top plane has a chord of 6 ft. 4 in., while that of the lower plane is 4 ft. 3 in., dimensions which give a wide field of view, especially for the pilot, the "blind" area being almost negligible. The interplane struts are each made in two pieces with the objects of economizing on timber and preventing the warping of the wood experienced in one-piece struts. The stream-line of the machine is good.

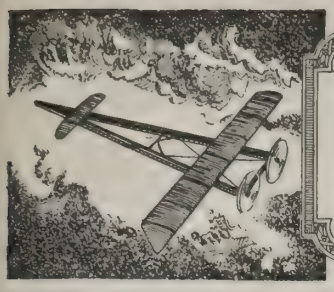
With the object of securing a low landing speed the wings are given a large angle of incidence with the ground on landing.

In a fuel pump of special and novel design all glands are done away with, a positive fuel seal being secured by the aid of an India rubber tube which conveys rotary motion to the pump spindle without itself rotating.

Easy and rapid manufacture has been kept in mind in the design of the machine. Complete dual control has been provided. Two Vickers guns are fixed to fire forward, while a Lewis gun is mounted on a rotating ring on the rear cockpit.

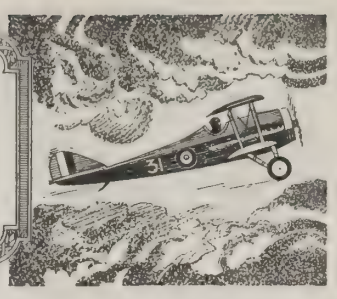


The Austin "Greyhound" two-seater. It has a 9-cylinder 320 H.P. radial A.B.C. engine



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



Model Building as a Trade

THE accompanying illustration shows the "Model Department" of the Curtiss Aeroplane Company. This is a part of the experimental department, and the purpose of building these little models is to make a miniature of some large machine for test in a wind tunnel.

As a wind tunnel is not familiar to many people I will describe one before going further. A very complete description of the Curtiss wind tunnel appeared in the June 30th issue of AERIAL AGE.

A wind tunnel is a long tube or funnel, through which is conducted a draft of air, generated by a large fan or propeller and kept in constant motion at a uniform velocity. To keep the air from twisting as would be the case as it leaves the blades of the fan, it is forced through a sort of honeycomb, which looks a good deal like an enlarged automobile radiator, and the air is steadied and continues on without any disturbing motion.

In the centre of this tunnel a special bar hangs from the top. To this bar the model is fastened, and any movement, no matter how small, is registered by instruments attached to the other end of the bar. The resistance of the model as well as the lift of the wings is noted, and from the results shown on the scales, the performance of the big machine can be determined and the designer knows whether or not to change the design.

As this model cannot be larger than three feet spread (this is the largest model most wind tunnels will accommodate) and as some of the larger machines have a spread of 125 feet or more, one can see how accurate the model must be made to get correct results. The tolerance by which the model makers much work is .001 inch and the finish of these models is like that on a high priced piano. These model makers earn large salaries for this work. The government hired hundreds of these titled people during the war to make models for experimental purposes, so the model enthusiasts who follow this page can see what a profitable and interesting art model making is. While the model makers shown in the picture are mostly men of age, there is no age limit or no ban against boys as model makers, as the only thing necessary is to make perfectly accurate models from blue prints and this like all other things must be practised.

The reader can distinguish many well-known machines on the bench and the one nearest looks like a "JENNIE," as our young lieutenants call the JN-4. Many other types of models can be seen, among them the Langley Tandem Monoplane.

Pontoon for Ford Motored Aeroplane

As promised in the last issue of AERIAL AGE I will describe how to build a pontoon for the Ford motored aeroplane recently designed and described by the writer in these columns. This pontoon is constructed in the same fashion as the ordinary "Box-girder" built-up body of an aeroplane (the Curtiss JN for instance), having four main members which are designed as longerons and the cross braces which are called struts. Instead of using wires and turnbuckles to brace the affair, a strut running from one corner of the cross struts to the corner of the one opposite is used.

The general dimensions are 8 feet long, 3 feet wide, and 9 inches deep. The front of bow has what is known as the scow type of entering edge. That is, it does not come to a point, but simply turns up in order to plane on the water. The back is made like the front, only the scow end is reversed. The main longerons are made of 1 inch square ash. The brace struts are made of ¾ inch ash except where the landing chassis struts attach to the float. At this point the struts are 2x1 inch.

The regular landing chassis struts are used with the addition of two or more struts running from the front body connection of the regular struts to the bow of the pontoon. When finished the frame work is covered with three-ply veneer and silk is fastened on with waterproof glue and varnished with a good spar varnish. The wing balancing floats are made of balsa wood and measure 2 feet x 9 inches x 6 inches.

Balsa wood is very light, but not strong. So in order to make it strong enough to stand up under hard usage it will be necessary to bind it with silk and waterproof glue, after which it is sandpapered well and given about five coats of spar varnish. It is necessary to sandpaper each coat before applying the next.

Drawings of this float will appear with the full dimensions and layout in the next issue of AERIAL AGE. We shall then start on the Flying Boat.



An interior view of the model shop at the Curtiss plant. It is in this department that models are made for wind tunnel experiments. About the room may be seen models of the J.N.4; the 18-B Biplane, 18-T Triplane, H-A Hydro, and suspended from the ceiling, the Langley Tandem Monoplane and one of the older model F Flying Boats



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

An Elegy in an Aerodrome

With apologies to Gray

The Verey fires the knell of parting day,
  The whining "Crabbes" flip slowly o'er the 'drome.
The Airman messwards plods his muddy way,
  And leaves the sky to Bristols and to bombs.

Now fade the twinkling hangars from the sight,
  And all the air a solemn silence holds,
Save where the "Camel" wheels his droning flight
  And distant rumblings stir the evening peace.

Save that from yonder camouflaged shed
  The bombers creep upon their nightly strafe,
To fill the Bosche with circumspectly dread
  And watch the movements of his troops upon the Front.

Oft does the flight to Death's dread sickle yield,
  And some brave man spins down to earth,
To crash beneath in some lone field,
  Oft-times to lie unmarked and quite unknown.

Ere long the roar of some twin engine breaks the night,
  As each machine comes down to land;
And so the sleepy pilots, weary from the fight,
  Wend their way to huts and sleep unseen.

—Blip-Switch, *Flight* (London).

The blushing young thing: "Thanks awfully for the flight. Do you know you inspire me with such confidence in the air that I would always trust you."

Aviator: "Is that so? I must take my tailor for a flip."—*Aircraft.*

Dropping a Passenger

Traveler (on the aerial express)—"I want to drop into Hickville, conductor!"

Conductor (looking at watch)—"Strap on your parachute—you walk the plank in seven minutes!"—*Buffalo Express.*

A well-known aviator fell ill and passed away peacefully. "Hullo, Jones," spoke his friend, when the two met in the abode of blues. "How did you get here?"

"Same old way," was the reply—"Flu." —*Aircraft.*

"What did you do in the Greek wars, daddy?"

"I was an aviator, my son. I was the first to fly from Troy when the invaders reached the city."—*Aircraft.*

Up in An Aeroplane

There's a charm fascinating,
That none but we know,
  Up in an aeroplane;
Ozonic elixir sets heart's fire aglow,
Supremely we hover o'er the earth-worms below.
  Up in an aeroplane;
Shrapnel may burst and cannon may roar,
Yet steadily on o'er the battle we soar,
While voices of vengeance are crying encore,
  For the bomb that we launched on the foe.
Then swiftly we turn and are back on our way,
The foe in pursuit, and we've no time to play,—
Death races with us, in a fanciful way,
  But we're ready for aught,—don't you know!

Perchance we are struck,
By a shot from below,
  Up in an aeroplane;
Our exit would quickly be taken, we know,
In defense of the Flag we're ready to go,
  Up in an aeroplane;
A "Devil Ace" moves at bugle's first call,
'Tho' under the wave or sailing o'er all,
He's ready for aught, and whate'er may befall,
  E'er eager to do and to dare.
If death wins, we drop as a meteor shoots,—
Like warriors true, we shall "die in our boots,"
And rest, in the ranks of the silent recruits,
  Till trumpet of Gabriel shall blare.

—*Frederick T. Rudiger.*



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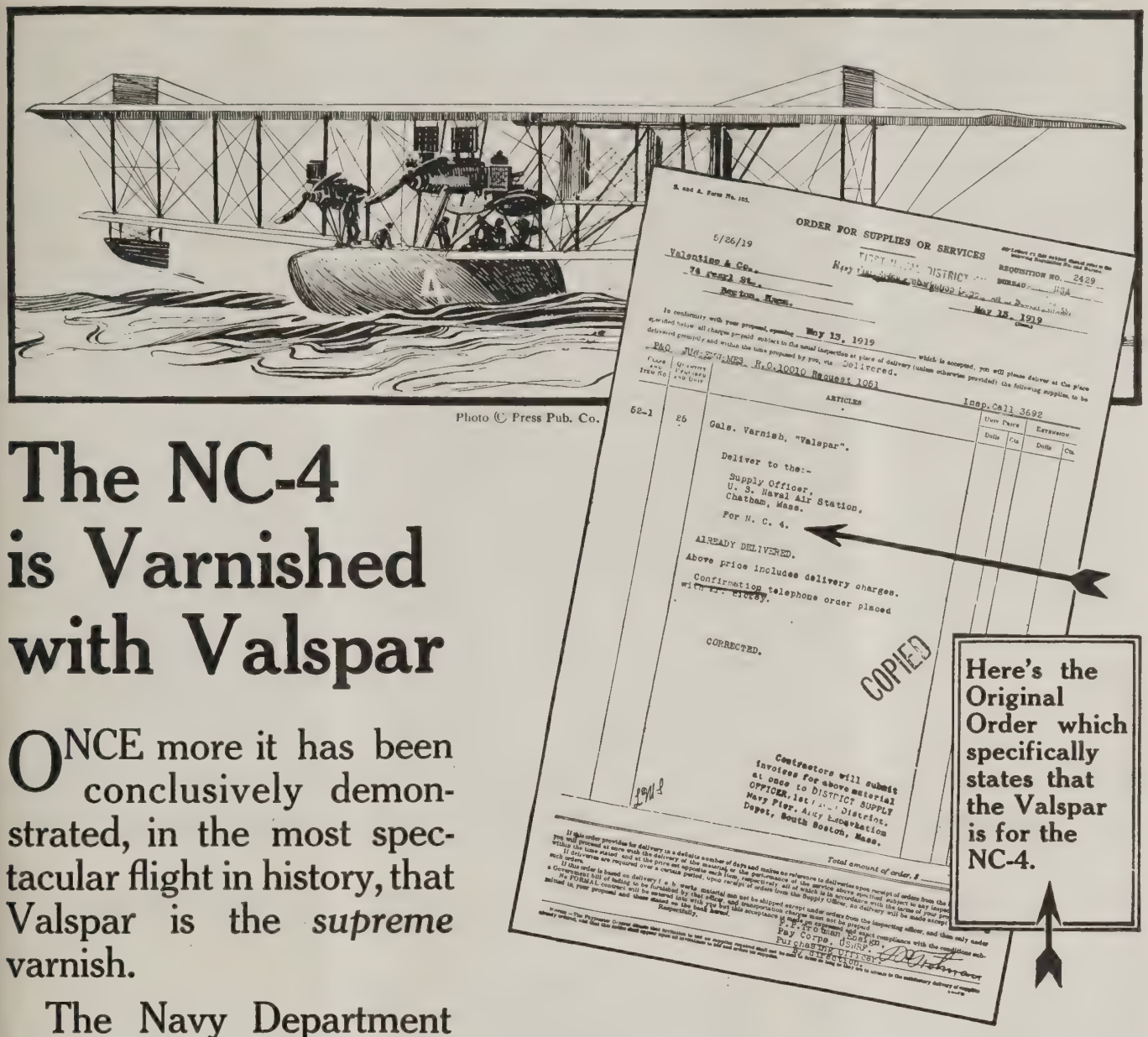


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(*Continued from page* 807)

yourselves and the United States naval service."

Admiral Glennon then shook hands with each of the airmen, telling them that they were free to do as they pleased until Monday, when they have to report to Washington for further orders. The officers and crew of the three NC boats then walked to the end of the pier, where their wives and friends were waiting in a room set aside for them. E. H. Howard, former chief machinist's mate of the NC-4, whose hand was cut off by a propeller on the eve of the flight from Rockaway Point, was one of those who greeted the aviators. He told them that he was glad the accident had not happened before it did, for then he would not have had the opportunity of working on the seaplane which made history for this country. Howard, who is regarded as one of the best mechanics in the naval air service, is still under treatment in the hospital.

Wearing the ribbon of the Royal Air Force Cross, which was first awarded to Hawker, and the emblem of the Order of the Tower and Sword, which was bestowed on him by the Portuguese Government, Commander Read talked briefly of the flight to Europe.

"I regret that the operation was not entirely successful," he said. "By that I mean that all of the three seaplanes did not get over. We have had a wonderful reception everywhere, but I am beginning to realize that the receptions are only just starting. If to-day's greeting is to be any criterion it will be a glorious homecoming."

After gathering in the office of Brigadier General G. H. McManusfi where they were congratulated by Colonel Archie Miller, commander of the army aviation field at Mineola, L. I., Colonel Frank Andrews, Inspector General of the Air Service, Captain King Snell, and other representatives of the army's air service, the entire party was taken in automobiles to Manhattan.

The navy's committee of welcome, in addition to Rear Admiral Glennon, included Captain P. Dymington, Lieutenant Commander W. F. Frost, Commander R. W. Cabaniss, in charge of the naval station at Rockaway Point, from which the NC planes started on their flight, and Lieutenant Commander Robert Donohue.

The piers at Hoboken were guarded by four hundred men of Companies C and D of the 13th Infantry, under command of Major Barrett. While the reception to the returning fliers was in progress the soldiers stood at attention along both sides of the pier.

The personnel of the NC-4, which returned on the *Zeppelin*, was as follows: Commanding officer, Lieutenant Commander A. C. Read; pilots, Lieutenant E. F. Stone and Lieutenant W. Hinton; radio operator, Ensign H. C. Rodd; engineer, Chief Special Mechanic E. Rhoades, and reserve pilot, Lieutenant J. L. B. Reese.

The members of the crew of the NC-3 who returned were: Commander J. H. Towers, commanding officer of the squadron; Commander H. C. Richardson, pilot; Lieutenant D. H. McCullogh, pilot; Lieutenant Commander R. A. Lavender, radio operator, and Lieutenant B. Rhoades, reserve pilot.

The officers and crew of the NC-1 were: Lieutenant Commander P. N. L. Bellinger, Lieutenant Commander M. A. Mitscher, pilot; Lieutenant L. T. Barin, pilot; Chief Machinist's Mate C. I. Kesler, engineer, and Machinist R. Christensen, reserve pilot.

Among the invitations extended yesterday to the fliers was one from Glenn H. Curtiss, who asked them to be his guests at a dinner at the Commodore on the evening of July 10. At this dinner Mr. Curtiss will present to the commander of each of the NC boats a model of the plane. Secretary Daniels has promised to attend, and invitations have been sent to the Governor General of Newfoundland, Brigadier General L. E. O. Charlton of the British Air Service, and scientists.

(*Continued from page* 819)

duty requiring him to participate regularly and frequently in aerial flights from March 18, 1918, to June 10, 1918.

The following-named officers will proceed to Fort Sam Houston, Texas, and report in person to the commanding general, Southern Department for assignment to duty: Second Lieut. Ernest M. Allison and Second Lieut. William H. Laughlin.

Second Lieut. Cornelius J. Maguire will proceed to Mineola, Long Island, N. Y., and report in person to the commanding officer, Hazelhurst Field for assignment to duty with the 3d Aero Squadron.

The following-named Air Service first lieutenants will proceed to Palm City, Cal., and report to the commanding general, Camp Hearn for duty with the Eleventh Cavalry: Albert H. Tebo and Hiram E. Wilson.

Second Lieut. Charles L. Webber will proceed to San Diego, Cal., and report in person to the commanding officer, Rockwell Field, for assignment to duty with the 2d Aero Squadron.

Capt. David S. Seaton will proceed to Washington, D. C., and report in person to the Director of Air Service, for duty.

Second Lieut. Thomas H. Marshall is transferred to Army and Navy General Hospital, Hot Springs, Ark., for further treatment.

Lieut. Col. Harry W. Gregg will proceed to Washington, D. C., reporting upon arrival to the Director of Air Service, on temporary duty not to exceed five days, thence to Detroit, Mich., take station there, assume command of the aviation general supply depot.



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The British Dirigible R-34 Which Successfully Trans-navigated the Atlantic in 108 Hours

British Dirigible R-34 Successfully Trans-Navigates Atlantic From Scotland to United States

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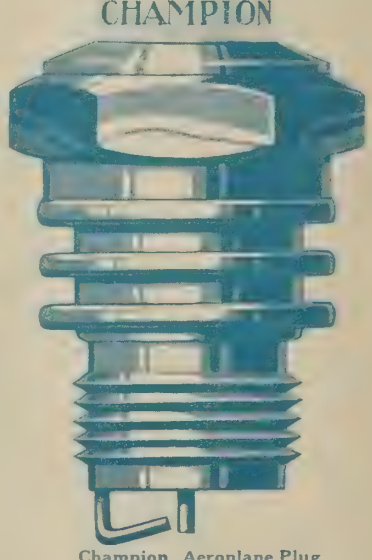
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THE R-34 CROSSES THE ATLANTIC

By HENRY WOODHOUSE

Chairman of the Dirigible Balloon Committee of the Aero Club of America, Vice-President of the Aerial League of America, author of the Textbooks of Military and Navy Aeronautics, etc., etc.

THE crossing of the Atlantic by the R-34 is an epoch making event and a splendid achievement, demonstrating what can be done by dirigibles.

The R-34 was at a disadvantage in this trip because it is the first trip across the Atlantic, and there was no definite meteorologic data available to assist the navigators.

Reading the log of the R-34 is very much like reading the log of an ocean liner, excepting that it was free from rough seas.

Their ability to escape the angry waves and its greater speed are two advantages which airships have over ships of the sea.

Once the air lanes are charted and the prevailing winds are known and suitable arrangements are made to manage the airships on the ground when they land, aerial navigation by airships will be much easier than the navigation of ships at sea.

We must learn to consider ships of the air as we consider ships of the sea. We must learn to operate and moor airships in the air, and only take airships into hangars when it is necessary to make repairs.

Towers and masts are to take the place of hangars for mooring airships, and the hangars will be used essentially as "docks" where airships are repaired.

With dirigibles of close to 3,000,000 cubic feet gas capacity already in operation, and others of 10,000,000 cubic feet capacity being planned, the dirigible looms up as a potential factor in the development of aerial transport.

We have learned a lot about dirigibles during the war, and when what we have learned is put into effect the result will be the operation of large dirigibles capable of carrying 100 tons of useful load each trip and commercially operated and capable of staying in the air for weeks without stopping.

Dirigibles have progressed very rapidly during the past eight years, but their greatest development is to come during the coming three years, when we may expect to see 10,000,000 cubic feet dirigibles capable of a speed of over 100 miles an hour, capable of rising to a height of 30,000 feet when necessary to escape storms or take advantage of trade wind currents.

Great Britain now leads in aeronautics, especially in the construction of dirigibles. She has surpassed Germany.

In the United States we have not yet begun to build large dirigibles, although they are most necessary to our national defenses and would be useful for transportation, to solve difficult problems of transportation.

Prompt Action Necessary

THE United States Army, Navy, the Aero Club of America, the Aerial League of America and civilian aeronautic authorities are anxious to end the ten years spell of national procrastination regarding dirigibles and would like to have the United States purchase the R-34 or its sister airship the R-33 as a model ship to use as a pattern for constructing a larger one in the United States, and as a practice ship for training a nucleus of personnel for a rigid airship service.

The cross Atlantic cruise of the R-34 has vindicated the sponsors of the rigid dirigible who have been urging the construction of rigid airships in this country for the past eight years.

Among the pioneers who urged the United States to build large airships in the United States have been Major Thomas S. Baldwin, who built the first U. S. Army dirigible in 1907 and who has been a persistent advocate of rigids for ten years; Rear Admiral Colby M. Chester, U.S.N., who urged the use of dirigibles for naval operations in 1906, thirteen years ago; Rear Admiral Bradley A. Fiske, U.S.N.; Colonel Charles DeF. Chandler, at present in charge of the Balloon Section, U. S. Army; Colonel Frank P. Lahm, U. S. Army; Colonel H. B. Hersey, U. S. Army; Major J. C. McCoy, U. S. Army; Alan R. Hawley, Augustus Post, Major Albert Bond Lambert, U.S.A., all of whom were pioneers in the development of the science and art of aerostatics, which comprises the dirigibles and captive and free balloons.

The construction of large dirigibles for the Navy was recommended on October 9, 1913, by the first Board of Aeronautics, which was convened by the General Board of the Navy for the purpose of formulating an aeronautic policy for the Navy. This first Board of Aeronautics consisted of Capt. W. Irving Chambers, U.S.N., Aeronautic Expert; Commander C. B. Brittain, U.S.N., Assistant Chief of Bureau of Navigation; Commander S. S. Robinson, U.S.N., Assistant Chief of Bureau of Steam Engineering; Lieut. M. H. Simons, U.S.N., of the Bureau of Ordnance; Naval Constructor H. C. Richardson, U.S.N., Bureau of C. and R.; Lieutenant J. H. Towers, U.S.N.; Aviator First-Lieut. A. A. Cunningham, U.S.M.C.

Similar recommendations were made subsequently by Rear-Admiral Mark L. Bristol, who was Director of Naval Aeronautics; Commander V. D. Herbster, U.S.N., who was Naval Attaché in Berlin; Commander J. C. Hunsaker, U.S.N., and Lieut. A. L. Smith, U. S. Marine Corps, who was Naval Attaché in Paris up to the beginning of the great war.

Major Baldwin, Commander Hunsaker, Commander Herbster and several other authorities actually went to Germany to study the construction of Zeppelins and gathered the knowledge and data required to build large rigid dirigibles.

Subsequently Admiral Sims, Admiral Taylor, and other naval officers and Secretary Daniels himself urged building large rigid dirigibles.

But once more the subject was treated like Mark Twain's weather. "Everybody talks about the weather," said Mark Twain, "but nobody does anything about it."

The Army and Navy authorities, like the civilian aeronautic authorities, now feel that the sure way of bringing this national procrastination to an end is to purchase immediately a large dirigible from Great Britain and use it as a model for the construction of a larger one and to train engineers and experts in this country.

The Army can finish the large hangar under construction at Langley Field by the end of next month to house the R-34 or the R-33, and the Navy is ready to construct a large shed at one of the Naval Stations for future rigids.

All that is required is prompt decision to go ahead.

Heretofore the practice has been to send a commission to Europe to study the subject. When the commission was away the Army and Navy administrations changed, and when the commissions returned their reports were filed away and no action was taken.

It is recommended that from now on the policy be to bring the best dirigibles available to the United States with competent experts if necessary to co-operate with American experts in producing even better dirigibles.

Encouragement should also be given to American firms and inventors to demonstrate the value of their products. A number of original American plans for what seem to be promising dirigibles have gone begging for the past three years. These should be investigated. This is a young science and revolutionary developments are possible. Inventive genius and experiments should be encouraged.

HOW THE R-34 WAS BROUGHT TO THE UNITED STATES BY THE AERO CLUB OF AMERICA AND AERIAL LEAGUE OF AMERICA

HOW the huge British dirigible, the R-34, was brought to the United States by the Aero Club of America and the Aerial League of America, through the generous offer of a very progressive officer of the Aero Club and Aerial League, who guaranteed the expenses of bringing it to the United States, became known to-day through a report made to the Board of Governors of the Aero Club by Mr. Augustus Post, the Secretary of the Club.

The report follows:

To the Board of Governors, Aero Club of America.

Gentlemen:

I herewith submit to the Board the report of the acts which resulted in bringing to the United States the large British dirigible, which is on its way to the United States.

This matter started last winter when Colonel T. E. Gilmore and another prominent British officer called on Messrs. Alan R. Hawley, the President of the Aero Club of America, and Henry Woodhouse, Vice-President of the Aerial League of America, and asked whether the Club and the League could assist in bringing to the United States one of the large British dirigibles, and stated that the greatest obstacle in the way of its coming was the lack of suitable landing place in a popular section of the United States.

It was found that the United States Army and Navy officials were willing to have this dirigible come over, but could not take the initiative in bringing it over. Therefore the assistance of the Aero Club and the Aerial League was enlisted.

As there were not any civilian landing fields available, nothing could be done at the time.

But in April, as soon as the Atlantic City Airport was established, an invitation was sent to the British Air Ministry to send the dirigible over.

The Air Ministry cabled that they were considering the invitation, and their cable was followed by a letter from Brigadier General L. Charlton, British Air Attaché, stationed at Washington, inquiring whether the Club could enter into an agreement with the British Government to supply the landing grounds, 700,000 cubic feet of hydrogen, 6,000 gallons of gasolene, 500 gallons of oil, mooring facilities—including 3,000 bags of sand, 300 men to handle the balloon, and other necessary equipment. He asked how much this would cost and whether the Aero Club of America could contract with the British Government to supply these things at a given price.

As the matter required immediate action and the Club and the Aerial League of America as organizations could not, without first canvassing their membership, assume the huge liability of bringing over this dirigible, which cost $2,900,000, an official of the Aero Club and of the Aerial League arranged to guarantee all the expenses and to supply free of charge all the above mentioned equipment.

It was estimated that the total cost would be about $70,000, excluding the cost of the grounds, and this gentleman stated he would be glad to meet this obligation for the Aero Club of America, the Aerial League of America and affiliated organizations so as to bring this remarkable dirigible to the United States without delay. He also agreed to pay the expenses of entertaining the staff of the dirigible at Atlantic City for fifteen days. General Charlton was advised to this effect, and he called at the Club and had a meeting with Mr. Alan R. Hawley and Mr. Henry Woodhouse, at which they went over every item of this project and a verbal agreement was entered into, which was confirmed in a letter dated April 9 from Colonel E. Gilmore, Assistant British Air Attaché, to Mr. Hawley, which is quoted herewith:

From: British Air Attaché,
Washington, D. C.

To: Alan R. Hawley, Esq.,
President, Aero Club of America,
New York City.

Dear Sir:

Following your conversation with General Charlton a cable embodying your verbal agreement, of which the following is a paraphrase, was forwarded to the Air Ministry:

Begins:—In connection with the proposed visit of a British dirigible the Aero Club of America and affiliated clubs will guarantee all expenses pertaining to hydrogen, oil, petrol, police, labor, housing, subsistance of personnel and mooring ground, requiring in return that airship visit Atlantic City during May, remaining at least fifteen days. If desirable, accommodation as terminus at Atlantic City available all summer. I recommend the visit and consider the terms satisfactory. A guarantee that the State Department will raise no objection will follow. Ends.

Will you kindly be return of post notify that this is satisfactory to you, upon which General Charlton will consider, conditional to a final ratification by the Air Ministry, the terms settled.

(*Signed*) *T. E. Gilmore, Ass't. Air Attaché,*
Washington, D. C.

The agreement was confirmed in the following letter to General Charlton, dated April 15, 1919:

Brigadier General C. E. O. Charlton, D.S.O.,
British Air Attaché,
Department of Military Aeronautics,
Washington, D. C.
My dear General Charlton:

This confirms the acceptance of the terms stated in your letter of April 9, regarding the proposed visit of the British dirigible to Atlantic City during the month of May and, possibly, for all summer.

Please assure your Government of our hearty co-operation in this and in any other matter in which we can assist.

Trusting you will not hesitate to call upon us whenever we can be of assistance in your splendid work, we remain

(*Signed*) *Alan R. Hawley.*

The Atlantic City Aero Club, through its President, Mr. Albert T. Bell, who has been a pioneer worker in aeronautics and arranged for the aviation meet held in Atlantic City in 1910 and also for the Vaniman dirigible projects in 1911, offered its co-operation in arranging for the receiving and mooring the dirigible at the Atlantic City Airport and also co-operated in securing the approval of the Department of State for bringing the dirigible over.

The Department of State answered that it had no objection to the dirigible coming over and that it had submitted the matter to the War and Navy Departments and that neither Department had any objections, but they believed that, whereas the dirigible is an official dirigible of military character, it should land in the United States at an Army or Naval Station.

It was stated that it would also be advisable to secure the approval of the Governor of New Jersey.

The officials of the Aero Club of America, Aerial League of America, and Atlantic City Aero Club, who were co-operating in this matter, agreed that, in view of the fact that the dirigible is a British military dirigible, it would be advisable to have it land at an Army or Naval Station, and that if either the Army or Naval authorities could arrange for it, it would be best to turn over the proposition to them.

Pending the making of such arrangements with either the Army or Navy, the matter was taken up with Hon. Joseph Tumulty, Secretary to President Wilson, and Hon. Walter E. Edge, Governor of New Jersey, and other officials, inviting their co-operation in arranging to have the unanimous official approval to bring the dirigible to the United States.

Mr. Tumulty referred the letter to the Department of State, which assured us of their approval. Governor Edge gave his approval in the following letter to Mr. Bell, President of the Atlantic City Aero Club:

My dear Mr. Bell:

I have yours of the 10th instant, and it gives me pleasure on behalf of New Jersey to second the efforts of the Atlantic City Aero Club and the Aero Club of America to have Atlantic City selected as the landing place for the British dirigibles,

(*Continued on page* 863)



The News of the Week



Aero Club Luncheon to NC Crews July 10

The luncheon planned by the Aero Club of America, in honor of the navy's transatlantic flyers, for July 2, which could not be given on that day because the commanders of the flying boats had to report at Washington, has been set for July 10 at the Waldorf-Astoria. An announcement to that effect was made over the signatures of President Hawley of the Aero Club and H. Pushae Williams, President of the Queensboro Chamber of Commerce.

The Aero Club will present medals to the aviators. Prominent officials of the navy, the army and the Government will be present.

$3,500,000 Expenditure for Naval Dirigible Hangars

Washington, D. C.—Under authority of the Naval Bill, construction on two large dirigible hangars will be begun in the near future. Rear-Admiral Taylor, head of the Bureau of Construction and Repair and Rear-Admiral Parks, Chief of the Bureau of Yards and Docks have been ordered to prepare the plans for the two hangars, which will probably be erected somewhere in the state of New Jersey.

Joseph A. Steinmetz Elected President of Engineers' Club of Philadelphia

Philadelphia, Pa.—Mr. Joseph A. Steinmetz, president of the Aero Club of Pennsylvania, was recently elected president of the Engineers' Club of Philadelphia. Mr. Steinmetz, in addition to belonging to many technical and industrial organizations, including the Aero Club of America, is a member of the firm of Janney, Steinmetz and Co. His election to the new honor has caused a great deal of felicitation and satisfaction among the membership of the club.

Los Angeles to San Diego in 75 Minutes

San Diego, Cal.—Lieut. A. Brokaw, piloting a Spad scout, flew from Los Angeles to San Diego, a distance of 160 miles, in 75 minutes.

Bishop to Preach From Dirigible Car

Columbus, Ohio. — Pending sanction from the War Department, plans are being made by the officials of the Methodist Centenary for a sermon by one of the bishops from the decks of a huge dirigible, the A-4, which has arrived here from Akron. If plans materialize, a bishop will ascend with the four army officers and will deliver his sermon through a large megaphone.

Dr. Helm Buys Curtiss Plane to Cover Professional Rounds

Garden City, L. I.—As a result of the successful use of the aeroplane by Dr. Frank Brewster of Beaver City, Neb., in making professional calls, Dr. W. B. Helm of Rockford, Ill., has ordered a Curtiss biplane. He was a visitor at the Curtiss plant at Garden City recently to look over a plane he expects to use in Illinois. He is one of the best-known surgeons in the middle West. Dr. Brewster recently flew sixty miles to perform an operation, making the trip in fifty minutes. It would have required two and a half hours by automobile and more than four hours by train.



Photograph of the reception and lunch given to the commanders and staff of the NC seaplanes in Paris, by the Foreign Service Committee of the Aero Club of America, on June 12th, at the former Aviation Officers Club. The American Ambassador, Hon. Hugh C. Wallace, as Hon. Chairman of the Aero Club Committee, presided. The following were present: Commanders A. C. Read, Towers, Bellinger; Captain Richardson; Lts. Mitscher, McCulloch, Stone, Barin, Hinton, Breese, Rodd, Christiansen, Thoades and Kessler.

Hon. Hugh C. Wallace, American Ambassador; Sidney B. Veit, Robert Woods Bliss, William S. Hogan, Dr. A. L. Hipwell, Louis D. Beaumont, Frank S. Lahm, Col. Ed. L. Gros, G. F. Campbell Wood, IsaacJones, M.D., Admiral Long, General Foulois, U. S. A. Air Service; Col. Whitehead, Captain Paulding, Secretary American Ambassy; Dr. Lines, President, American Club; Ridgley Carter, Chairman, Paris Section, U. S. Navy League; Mr. Mower, Hon. Secretary, Paris Section, U. S. Navy League; Prof. Mark Baldwin, Former Pres., Paris Section, U. S. Navy League; A. Mascuraud, Member of French Senate; de Saint Blancard, Secretary, Aero Club of France; Mr. de Sillac, Foreign Service; Louis Bleriot, first to cross English Channel in a plane; Lieut. H. Roget, French Army Air Service, who flew from Willacoublay (near Paris) to Rabat (Morocco); Comte de Beaumont, Vice-President, Cercle Interallié; Lieut. de Romanet, French "Ace"; General Harts, Base Commander of Place of Paris; Major Angelo di Nola, Italian Air Service; Comte de la Vaulx, Vice-President, Aero Club de France; Mr. Howard E. Coffin, American Aviation Mission; Mr. S. Bradley, American Aviation Mission; Captain H. C. Mustin, American Aviation Mission; Lieut.-Commander Correy, American Aviation Mission; Mr. Keys, American Aviation Mission; Lt. Wurtz, American Aviation Mission; Lt. Masquielin, American Aviation Mission.

The speakers at the banquet were as follows: Hon. Hugh C. Wallace, Admiral Knapp, U. S. N. Air Service; General Foulois, U. S. A. Air Service; Baron d'Estournelles de Constant, President of the Aviation Commission in the French Senate; Captain de l'Escaille, French Naval Air Service; Deutsch de la Meurthe, President, Aero Club de France; Commander Read, Commander Towers, Mr. Louis Bleriot.

Handley Page Attempts Newfoundland-Atlantic City Flight

The huge Handley Page biplane which has been at Harbor Grace, Newfoundland, for the past few weeks preparatory to a transatlantic flight, attempted a flight from Newfoundland to the Atlantic City Airport on July 5, but was forced to land through engine trouble at Parrsboro, N.S., 525 miles from the starting point. The incomplete reports which are available as we go to press would indicate that the damage done to the machine is so great that it will be unable to proceed to its destination. None of the crew was injured.

Banquet to Commander Read and NC Crews

Lieut. Commander A. C. Read, American naval flyer who crossed the Atlantic in the NC-4, and Commander John H. Towers and Lieut. Commander P. N. L. Bellinger, who also attempted the crossing and made a gallant fight in reaching the Azores, were dined at the Hotel Commodore on July 3.

Commander Read told the people present that the airboats of the future will have to be considerably larger than the NC craft.

At the guest table besides the aviators were Major Gen. Charles T. Menoher, Chief of the Army Air Service; Rear Admiral James H. Glennon, commandant of the Third Naval District; Commander H. C. Richardson of Commander Towers' crew; Commanders J. C. Hunsaker, G. C. Westervelt, Glenn H. Curtiss, United States Senator New of Indiana, Congressman La Guardia, and Brig. Gen. L. E. O. Charlton, British Air Attaché at Washington.

Army Aviator Elopes in Aeroplane

Hays, Kans.—Lieut. Warren P. Kite, for twenty-two months instructor at Kelly Field, eloped with Miss Orpha Kate Arnold, ranch owner and oil operator of Larned, Kans. After a 55-minute flight, he landed at Hays, where the ceremony took place. Lieut. Kite arrived at Larned nine days previous to the wedding in order to participate in local homecoming celebrations, during which he became acquainted with the bride. Lieut. Kite is from Springfield, Mo., and will make his home there.

Spares Delivered 150 Miles by Plane An Hour After Order

Washington.—A De Haviland-4 aeroplane flew recently from Hazelhurst Field, Mineola, to Albany, with spare parts, to make minor repairs on one of the seven De Haviland planes in the squadron making the Dallas-Boston flight.

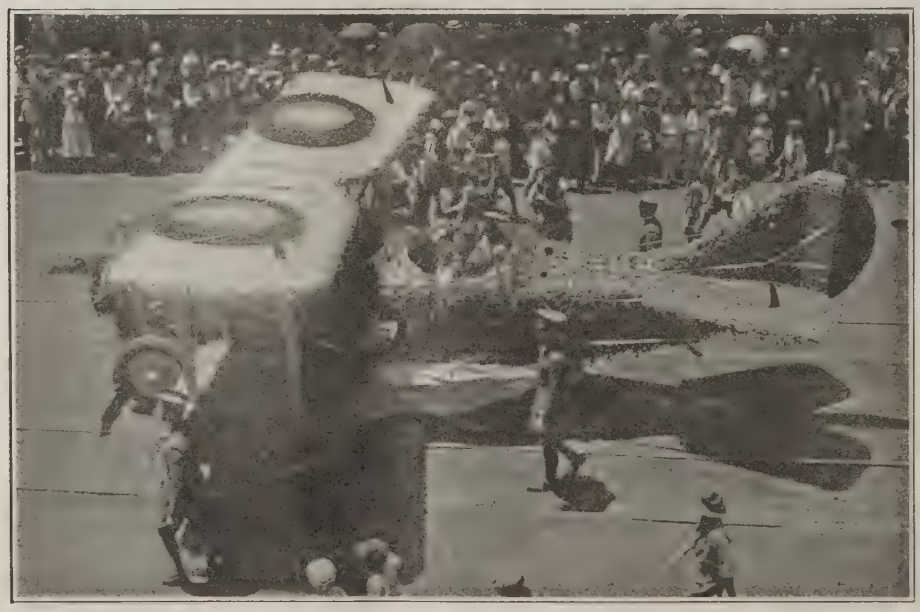
Col. H. B. Claggett, commander of the squadron, telephoned Col. Archie Miller, at Hazelhurst, to send up the spare parts. Sixty-five minutes later they arrived. Fifteen minutes were required to make the repairs. Sixty minutes later Lieut. Ralph C. Kilpatrick, pilot, and Major Henry J. E. Miller had returned to Hazelhurst. They made the 220 miles of the round trip in 125 minutes.

Navy Dirigible C-8 Explodes

The U. S. Navy dirigible C-8, sister ship of the C-5, which was blown to sea from St. John's, Newfoundland, some weeks ago, and never heard of again, exploded with great force at Camp Holabird, near Baltimore, Md., on July 1, just after having made a forced landing while on her flight from Cape May, N. J., to Washington. It is uncertain if the sudden heat in the atmosphere to which the ship was subjected when she made her landing, or the careless handling of a cigar or cigarette by some civilian, ignited the gas. A large crowd surrounded the craft at the time of the explosion and several civilians were burned, but none killed. The officers, crew and passengers of the dirigible who escaped injury included Lieut. N. J. Learned, U.S.N.R.F., commanding officer; navigation officer, Lieut. R. I. Weyerbacher, U.S.N.; directional pilot, Ensign C. W. Tyndall; engineer, Warrant Officer B. F. Sherman; Machinist's Mate Kellar and Radio Operator Lynch. The passengers were Lieut. Commander Quigley and Lieut. A. R. Tilburne. A court of inquiry was ordered to determine, if possible, the cause of the explosion.

Lowney's Chocolates Delivered by Air

Boston, Mass.—Deliveries of Lowney's chocolates by aeroplane was inaugurated on June 27, between Boston and Portsmouth, N. H. Circulars were dropped from the plane which was piloted by E. A. Terhune, Jr., general manager of the North Shore Aerial Transportation Co.



Los Angeles "said it with flowers" to Eddie Rickenbacker, on his first visit there after his return from France

Cotton to Be Shipped by Aeroplane From Georgia to Massachusetts Cotton Mill

Air service of the Army has accepted the offer of the Chamber of Commerce of Americus Georgia to furnish a bale of cotton to be transported by aeroplane from Americus to the Merrimac Manufacturing Company at Lowell. Mass., to be manufactured into print cloth of a specially prepared design submitted by the Air Service and to be distributed by aeroplane as a souvenir representing aerial progress in the transportation of raw material from the cotton fields of the south to the factories of the north to be manufactured and distributed as a finished product.

Mayor Perry D. Thompson, of Lowell, has completed arrangements for the reception of the cotton and its manufacture into cloth and President J. E. Hightower, of the Americus Chamber of Commerce, will have it compressed for shipment. Orders have been issued to the commanding officer at Souther Field, Ga., to provide the aeroplane and assign an officer to make the flight and to the Air Service officer of the Northeastern Department at Boston to designate a suitable landing place at Lowell.

It is quite probable a DeHaviland 4 will be used to transport the cotton. Distance via Washington, New York and Boston about eleven hundred miles.

NC-4 to be Placed on Exhibition in New York

Washington, D. C.—Secretary of the Navy Daniels, in response to numerous suggestions, has ordered Rear-Admiral Glennon to make arrangements for exhibiting the NC-4 in Central Park, New York City, for a period of one week, provided City officials approve the plan.

Count di Zopolla, of Italian Air Service, Weds Miss Mortimer

Count Maris di Zopolla, of the Italian Air Service, who took an active part in the air service on the Italian front, married Miss Edith Mortimer, daughter of Mr. and Mrs. Stanley Mortimer.

Aerial Board Created in Canada

An Aerial Board has been created in Canada under an act passed during the present session, with Hon. A. L. Sifton, chairman; General Mewburn and Hon. C. C. Ballantyne representing the militia and naval service departments respectively, as members; Lieut.-Col. C. M. Biggar, vice-chairman, and other members including: Dr. R. M. Coulter, Deputy Postmaster-General; J. A. Wilson, assistant deputy Minister of Naval Affairs, and Edward S. Busby, chief inspector of the Department of Customs and Inland Revenue.

The board will frame regulations regarding civil flying. Present regulations in force were passed under the War Measures Act and will lapse with the declaration of peace. It will supervise all matters connected with aeronautics; the control and management of aircraft necessary for the conduct of the public service; the fixing of routes of travel, etc.

First Flight Over Adirondacks Successful

Lake Placid, N. Y.—In the first aeroplane to fly over the Adirondack Mountains Lieutenants W. R. Taylor and F. Paul Stevens arrived here on July 1, after a 300 mile flight from Mineola to take part in the official homecoming welcome to be extended to its war heroes by Essex County.

Curtiss "Oriole" to be Delivered From Garden City to Denver by Air

In order to facilitate delivery of a Curtiss "Oriole" which he purchased, I. B. Humphreys of Denver, Col., is sending a pilot to New York with the intention of flying the plane to Colorado. A. M. Lendrum, who is an experienced army pilot, is expected to leave New York early next week to make the flight. The "Oriole" is the plane that won the prize for being the first to fly to Atlantic City. This one will be equipped with one of the new Curtiss K-6 150-horsepower motors. It is designed especially for high altitude work.

Bout in An Aeroplane Latest Recruiting Stunt

The recruiting service of the Army has planned a novel stunt in connection with their recruiting campaign. A boxing match aboard an aeroplane will take place over Camp Dix, providing the New Jersey State Boxing Commission enters no objection, though how far above the earth the authority of the commissioners may run is a question.

Lieut. John S. Donaldson, of the First Pursuit Squadron, challenged all comers to meet him with gloves. The challenge was accepted by Lieut. Leroy M. Wightman, a machine gun officer handy with the padded mitts. The boxers will be belted within a tiny ring in the tonneau of a large bombing plane so that there will be no danger of a plunge to earth in case of a knockout. The flying ring will be driven by Sergeant John Moore, and it is planned to have the referee and timers in another plane that will keep alongside the boxers' plane so that they can judge the points and time the rounds.

San Diego to San Francisco Non-Stop Flight in 4½ Hours

Washington, D. C.—Official announcement from the Air Service states that on July 2 two army aeroplanes, a De Haviland 4 and a La Pere fighter covered the 610 miles between San Diego and San Francisco in 272 minutes, at an average of 136 miles an hour. Lieut. John W. Shartnack piloted the La Pere with M. S. E. Barnard as passenger, and Capt. Lowell H. Smith flew the DH-4.

Sales of Surplus Supplies

Washington, D. C.—The Director of Sales announces that on June 20, $3,254,619 had been paid for surplus material from the Department of Military Aeronautics, which cost the War Department $21,700,000. The surplus of November 11 is valued at $85,000,000, of which 26 per cent is sold. For the Bureau of Aircraft Production the figures are as follows: Surplus, Nov. 11, 1918, $62,000,000; value of material sold, $5,400,000; price paid for material sold, $3,317,809; percentage of surplus sold, 9%.

Woman of 80 in Aeroplane Flight

Washington.—Mrs. Martha H. O'Neill, 80 years old, of Gettysburg, Pa., on June 27 experienced the thrills of her first flight in an aeroplane. She had won the right to make this flight by selling the largest number of Victory bonds in the recent campaign in her home town. She was a passenger in an army aeroplane piloted over Gettysburg battlefiebld by Lieut. Fred Nelson of the Aviation Supply Depot staff at Middletown, Pa.

Aeroplane Reconnaisance to Locate Mosquito Breeding Places a Success

One of the novel uses to which the aeroplane is now being put is that of locating pestilential swamps and marshes. The Navy Department reports that Ensign Van Court, of Hampton Roads, recently made a successful trip along the North Carolina coast in the vicinity of Morehead City for the purpose of spying out territory which should be drained or purified.

Ensign Van Court's job particularly is to find the breeding places of mosquitoes, and as those are discovered steps are taken by sanitation engineers for their elimination.

Admiral Sims Predicts Extended Use of Aerial Bombs and Torpedoes in Naval Warfare

New Haven, Conn.—In depicting the naval battle of the future in an address at the alumni banquet of Yale University, Admiral William S. Sims emphasized the importance of aircraft in deciding naval combats.

"Aeroplanes will launch torpedoes that have a range of more than five miles," said Admiral Sims. "Other 'planes will drop bombs of great size, weighing 3,000 pounds, and still others will control by wireless super-torpedoes carrying an explosive charge of more than one ton. Fleet submarines may be present in great numbers, and many automatic mines may be laid in front of the fleets.

"With both commanders determined to fight a decisive action, the issue will be decided in a short time, and the result will be the practical destruction of the defeated fleet."

Chaperones Must Accompany Vassar Girls on Aerial Joy Rides

Poughkeepsie, N. Y.—Because a student at Vassar took a long air ride with a young lieutenant in the U. S. Air Service, the possibilities are that aeroplane joy rides may become prohibited by the social laws of Vassar College. The student's name has been withheld, but because of her exploit the students have considered inserting rules for aeroplaning into the laws, which are made and enforced by the students' association.

An army aviator was flying over the college grounds, and landed in the driving park. He asked one of the students strolling nearby whether she would care to go up with him, and she accepted. It is not yet decided whether this is a violation of the rule against going riding unchaperoned but aviators are advised for the present to use three-passenger planes.



The Bristol Coupé with 264 H.P. Rolls-Royce Engine

BRITISH DIRIGIBLE R-34 SUCCESSFULLY TRANS-NAVIGATES ATLANTIC FROM SCOTLAND TO UNITED STATES

THE British dirigible R-34 arrived at Roosevelt Field, Mineola, L. I., at 8:45 o'clock in the morning of July 6, circled the field three times to make observations, and at 9:21 o'clock the first overseas air pilgrim Major John Edward Maddock Pritchard, landed upon American soil, after a parachute drop of 2,000 feet.

This completed the longest flight in history, the distance covered being 3,200 miles, not counting the mileage forced upon the flyers by adverse winds. The time consumed was a few minutes more than 108 hours. The big airship brought over thirty-one persons, one of whom was a stowaway, and a tortoise shell cat.

The R-34 was built for the British Admiralty at the Airship Works of Wm. Beardmore & Co., Ltd., Inchinnan, Renfrewshire, Scotland. The ship is about 650 ft. long by 80 ft. in diameter, and it has a capacity of more than 2,000,000 cubic feet, with a useful lift of over 30 tons. She is fitted with Sunbeam-Cossack engines and capable of attaining a speed of about 70 miles per hour. The ship's complement numbers about 30.

The R-34 is one of the two largest dirigibles in the world and is about 670 feet long. Although the construction of the two dirigibles had been in progress at Inchinnan, near Glasgow, for months before the end of the war, it was not until last February that the Admiralty admitted that it had plans for airships even larger than the German Zeppelins.

The R-33, equipped as an aerial battle cruiser, had her trial flight about March 1, and her sister craft took to the air a few days later. It was announced on March 22 that the war equipment of the ships would be partly dismantled and that they would be prepared for a flight across the Atlantic.

It is an open secret that the large rigid airships, R-33 and R-34, do not represent the last word of the Admiralty in this branch of aeronautical effort. There are in hand at the present time at least four other rigid airships of greater size than the R-34, representing a distinct step in advance of any already produced, and it is understood that their completion is hoped for by the end of the year.

The secret of successful long distance flying lies mainly in the efficiency and reliability of the engines, which, in the case of the later rigid airships built or building for the Admiralty, are of Sunbeam-Coatalen design. The R-34 is fitted with four 350 "Cossack" type engines, whilst the two others in addition to having a similar number of "Cossack" engines are equipped with two "Maori" engines of 250 h.p. each, making a total of 1,900 h.p. for each airship. Such figures of engine power in comparison with what obtained in the early days of aviation, when perhaps a 20 h.p. engine was the sole unit, are staggering, but it is safe to say that even now the limit of engine power has not been reached. A very high degree of general efficiency and power maintenance over long periods has been attained for some time past by Sunbeam engines, which possess a reputation second to none.

The Sunbeam Maori engine is of the 12 cylinder, 60°, water-cooled, "V" type, rated at 250 h.p. At ground level the b.h.p. at 2,100 r.p.m. is 265 and at 2,200 r.p.m., 280. Bore, 3.93" (100 mm.); stroke, 5.31" (135 mm.). Bore and stroke ratio, 1.08 to 1. The mean effect of pressure in pounds per square inch is 128. Compression ratio, 3.6 to 1.

There are four valves per cylinder, two inlet and two exhaust. Inlet valves have a lift of .3543" and exhaust valves a lift of .3500". The firing order of the cylinders is as follows: 1-5-3-6-2-4.

Either four Siemens or four W.B.G. Magnetos are used. The W.B.G. Magnetos each weigh 19.1 pounds and their speed x engine speed is 1.5. K.L.G. or C.B. spark plugs are used.

Two gear type oil pumps, one centrifugal water pump and one plunger type air pump are provided. Four C.H.B.Z.S. 42 mm. carburetors are used.

The ratio of gear reduction is 2 to 1 in the "Maori" aeroplane engine, and the propeller is run at one-half engine speed, but in the airships R-33 and R-34, the propellers are driven direct.

The engine complete weighs 830 pounds. Fuel is consumed at rate of 139 pints per hour and oil at 6.5 pints per hour.

The overall dimensions of the Sunbeam "Maori" are as follows: Length, 55.11"; width, 35.46"; and height, 33.85".

When the Air Ministry began to discuss the ocean flight it was planned that one of the ships should take a northerly course and the other should proceed to America by swinging to the south. In dismantling the war equipment, however, it was found that there was too much work to do on the R-33 to prepare her for the flight, and it was decided that only the R-34 should be remodeled. In carrying out this plan the Admiralty formally took over the dirigible from the Air Ministry about May 30 and sent her out on a series of practice flights. The ocean flight was held up by the uncertainty preceding the signing of the Peace Treaty, and the airship took a test flight toward Germany.

The length of the vessel is equal to that of a good-sized ocean liner, and she has a beam of seventy-nine feet, making her almost as wide as some of the large ocean-going ships. From the bottom of her lowest gondola to the top of her gasbag is about ninety-two feet. She has five cars, or gondolas, suspended from her framework, and all are connected by an immense platform about 600 feet long.



The officers in charge of the R-34 on its epoch-making journey from Scotland to America

© Keystone

A wireless set in the forward gondola has a range of about 1,500 miles and will be used in enabling the captain to direct his course if the sun and stars are obscured.

The airship weighs about thirty tons, and its useful load is about twenty tons, according to Colonel Lucas. According to the same authority it displaces about sixty tons of air.

Major G. H. Scott, the commander of the R-34, described the trip as follows:

"The voyage was a very enjoyable and most successful one. The total mileage was 3,200, and we covered that distance in 108 hours and 12 minutes. The thunder squalls we encountered on the way across caused the delay.

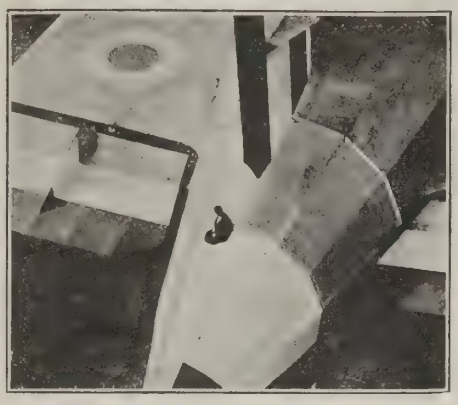
"We will leave for home on Tuesday morning about daybreak. We may start around eight o'clock. That is not settled definitely yet, and much depends on the atmospheric conditions.

"We are not certain whether we will go to Washington and Philadelphia, but probably will not. We are planning now to make a flight over New York City before we take out across the ocean. We may go back by way of Boston.

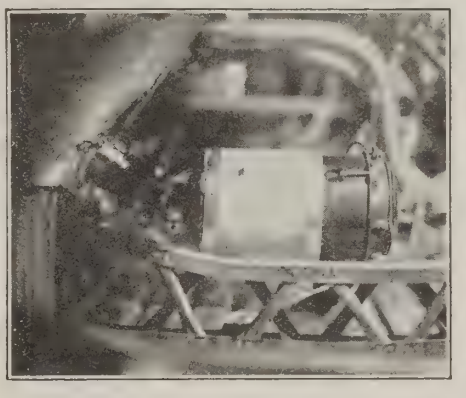
"The return trip, I think will not take more than seventy hours. Of course it will not be so difficult, as we will have the wind with us and probably will meet better weather conditions.

"Coming over we had a crew of thirty men and one stowaway. Not one man suffered any kind of illness. We were all in fine shape when we landed at Roosevelt Field. But we had only enough gasolene to operate a few more hours, and you can see we were very fortunate.

"The stowaway will not make the return trip, but will be left here. He probably will be court-martialed in the near future, but I do not think he will be subjected to any severe punishment. The only change in the crew on the way back home will be the addition of Lieutenant Commander W. A. Henssley, of the United States Naval Air Service, who will take the place of Commander Zachary Lansdowne.



The "crow's nest" of the R-34



The "cooker" on the R-34, which was used for the preparation of meals en route

"Some of the time we were flying as low as four hundred feet above the ocean. At other times we were as high as 6,000 and 7,000 feet. The altitude varied greatly. All the way over it depended on the wind. We had to keep changing our altitude with the changes in the weather. We encountered strong winds and used five engines, and then at times when the weather was real good we only used two engines. We ran out of gas sooner than we expected because of the strong winds.

"Had the heavy wind over the Bay of Fundy continued through the night we would have been forced to land near Boston. We would not have been able to have made Mineola. The change in the wind came early this morning and it was then that I decided that we could reach Roosevelt Field. I ordered the course changed then.

"We had only four ticklish moments on the way over. Those were during the thunder squalls. They were not serious, however. The only thing that we really feared during the storm was damage to the frame or rudders."

On board the R-34 was a stowaway, formerly one of the crew, who had been dropped a couple of hours before the dirigible left Scotland for the United States. He was found the second day out and had to "work his passage" over.

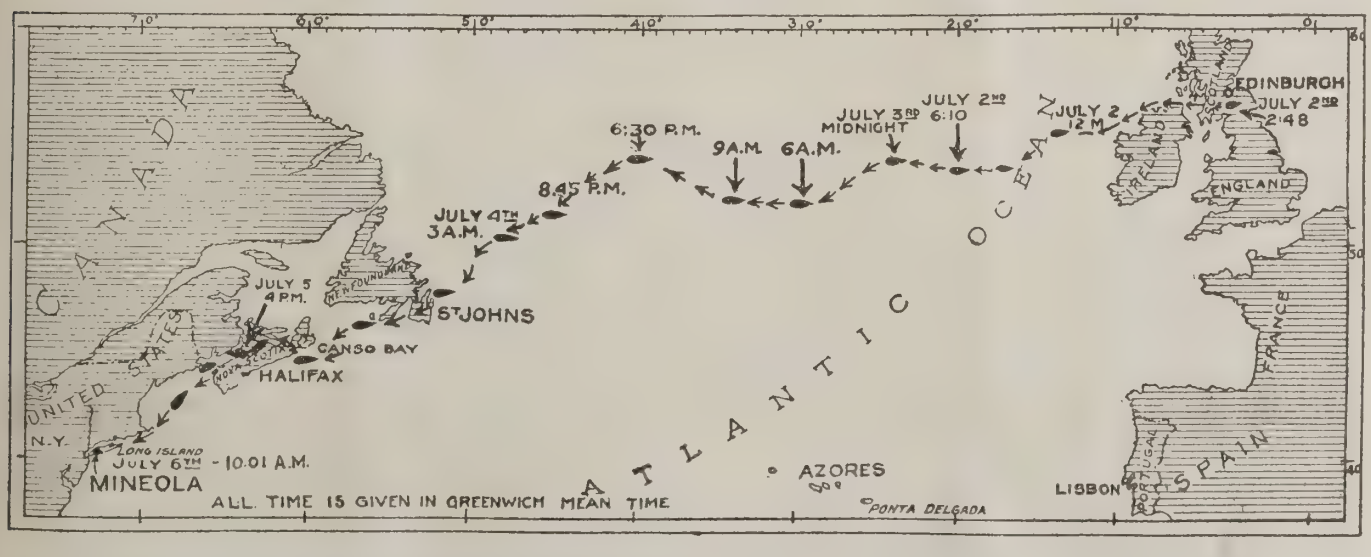
W. W. Ballantine, the stowaway, had an interesting tale of the trip. He said he lives in Cromwell, and up to two hours before the R-34 left East Fortune, Scotland, he was one of the crew, a rigger. He declared also that a few years ago he was a prize fighter in England.

"I was a rigger on the R-34 and was never more surprised in my life than when I received orders two hours before the dirigible sailed that I was not to be taken along. I was in the rigging when I received the sad news, but I made up my mind then and there that I was going along."

Secretary of the Navy Daniels sent the following message to Major J. H. Scott:

"The American Navy extends its greetings to you and to the heroic crew of the R-34 and congratulates you on the success of your great flight across the ocean. The arrival in America of the first lighter-than-air craft to cross the Atlantic marks another decided advance in navigation of the air. Coming so soon after the flight of Read, Alcock and Hawker, it completes a remarkable series of achievements in aviation in which British and Americans may take a just pride and which have served to increase the cordial relations and comradeship of the two navies which have prevailed throughout the war. America joins with Britain in honoring you and the service you represent.

"JOSEPHUS DANIELS."



The route of the R-34 from East Fortune, Scotland to Mineola, a journey of approximately 3200 miles, made in 108 hours

The AIRCRAFT TRADE REVIEW

Valspar Shipped by Aeroplane

The first shipment of varnish by aeroplane was made on June 26th by Valentine & Co., who sent one hundred cans of Valspar from their Brooklyn factory to C. Y. Schelley & Bro., their local dealer at Allentown, Pa.

The cargo left the field at Long Beach, L. I., at 9.45 a. m. and covered the one hundred miles in seventy-six minutes. This flight was made in a Canadian JN-4, during a steady rain, and with low hanging clouds along the trip. Owing to the necessity of getting the shipment to Allentown in time for a Friday sale, the trip was carried through in spite of the inclement weather.

Lieut. Lyman B. Lockwood and Lieut. Edw. K. Merritt were the pilots on this trip, which was the fourth to Allentown, operated on a regular aerial delivery service between the two cities, by the American & Canadian Allied Flying Circus, Inc., of New York.

The plane was Valsparred the day previous to the flight, and in spite of the steady rain which continued throughout the flight it was in as good condition as when it started.

Mr. Frank P. Connolly, manager of the specialty department of Valentine & Co., who suggested the flight, was highly elated over the record made, and expressed his confidence in the aeroplane as the vehicle of the future for the transportation of merchandise.

Splitdorf Auxiliary Magneto Solved Problem of Starting Liberty Motors

A most picturesque but risky method is ordinarily used to start aeroplane engines. The mechanic shouts "Off!" as he approaches the propeller and is answered in kind by the pilot at the switch. He then spins the great wooden blades by hand to charge the cylinders with gas. Having worked up a warm perspiration, even on the frostiest mornings, he springs clear and shouts "Contact!" The pilot indicates that he has closed the switch by repeating the signal, and the mechanic once more approaches the propeller. With a single swift motion he twirls the blade through an arc of more than 90 degrees and steps quickly away from and to the side of the murderous whirling stick.

A 150-horsepower engine is about all any but a Samson can swing. When heavier engines, culminating in the 400-horsepower Liberty, made their appearance, new methods had to be devised. At first, the blade was pulled over compression, by running past it, giving it a smart pull in passing. Sometimes two men with hands joined were required. As many as three were required to do the preliminary "winding up" or charging. More than one unwary mechanic was sucked into the whirling circle of the propeller and injured before a safer method was devised.

Owing to their weight and complication, electric starters were not considered seriously, but an ingenious auxiliary magneto was contrived by the Splitdorf Electrical Co. of Newark, N. J. This magneto was operated by a small hand crank in the pilot's cockpit. The engine was charged in the usual way, whereupon the mechanic stepped back, shouting "Clear!" The pilot then closed the switch and turned the crank of the starting magneto a few times. The supercharged cylinders received a shower of white-hot sparks and failure to start at a lively clip was exceptional. With the Dixie starting magneto a lone pilot might start a 400-horsepower engine unaided, a thing previously impossible.



Richard H. Depew, Jr., formerly Captain, Air Service, is in charge of enrollment at the Curtiss Flying School

Will Not Restrain Aeroplane Sales

Federal Judge A. N. Hand has denied the motion of the Curtiss Aeroplane and Motor Corporation for a preliminary injunction restraining the United Aircraft Engineering Corporation from continuing an alleged infringement of fourteen patents covering the JN-4 aeroplanes. After the war the defendant bought from the British the aeroplanes and motors and is now selling them in the United States. In his opinion Judge Hand said that a patentee selling his patented article in a foreign country cannot afterward claim an infringement of the patent in the United States, if the article is brought here unless a clause appears in the contract prohibiting export to this country.

Bosch Magnetos at Indianapolis

Indianapolis, Ind.—The success of Bosch magnetos at the Victory Sweepstakes at Indianapolis is another proud record to the credit of the Bosch Company, makers of automobile and aeroplane magnetos. Not only was first, second and third place won by Bosch equipped cars, but of the thirty-three cars which started in this race twenty-two of the world's greatest drivers chose Bosch magneto ignition, and it is a matter of official record that there was not a single ignition adjustment of any kind made during the whole race on any of these twenty-two cars.

Curtiss Aviation School Opens

This week will mark the opening of the Curtiss Aviation School at Garden City, L. I., under the direction of Roland Rohlfs, test pilot for the Curtiss Engineering Corporation, and Richard H. Depew, until recently a captain in the United States Air Service.

More than 200 applications have been received from all parts of the United States, as well as Canada, Mexico, Argentine, Cuba and Italy. The first student to enroll in the school is Alberto Chiesa of Milan, Italy, who has come to America to receive instruction in flying.

Rohlfs, who has been instructor and test pilot for the Curtiss Company, has had more than 2,000 hours in the air, and during his career as a flier he has flown all the Curtiss models—both land and water—including the new three-passenger Oriole, the record-breaking Model 18-T triplane which was designed especially for war purposes and which has since been modified for peace-time flying, and the new Curtiss mail machines.

Depew, who was a flier for the Curtiss Company before the war broke out, was a test pilot at McCook Field, Dayton, O., while in the Air Service of the U. S. Army.

The course to be offered will differ from the methods used by the army. Instead of the three-months' ground school course, followed by several weeks of actual flight, it is the aim of the instructors to teach the principles governing flight simultaneously with actual flying. The course will include lectures on aerodynamics, theory of flight, construction and repair of aeroplanes and motors. Following the lecture, the student will be taken up into the air and taught to apply his theories.

The America Trans-Oceanic Company, distributers for New York and Florida, will operate a water-flying school at Port Washington, L. I. The Curtiss Flying Station at Atlantic City will operate both land and water schools, as will the Curtiss Eastern Airplane Company, distributers for Pennsylvania, Maryland and Delaware. The Curtiss Airplane Company of New England, with headquarters at Boston, will operate schools; also the Curtiss Southwest Airplane Company at Tulsa, Okla., and the Curtiss Northwest Airplane Company at Minneapolis. I. B. Humphreys, distributer for Colorado, will operate a land school, and Sydney Chaplin, brother of the motion picture star, and distributer for southern California and Arizona, will operate schools in California at the Catalina Islands. George W. Browne of Chicago, distributer for the Middle West, will start a school under the direction of Lee Hammond, who conducted experiments for the Navy in flying land machines from the decks of battleships.

Major J. E. H. Stevenot has left for the Philippine Islands to open a school.

In addition to these, many individuals who saw service during the war are starting schools, and, judging by the amount of interest shown, flying will soon be a more or less commonplace accomplishment.

Many schools are also taking up aviation. The Junior Plattsburg camp will inaugurate a course of instruction in aeronautics and Castle Girls' School at Tarrytown-on-Hudson will offer a course in aeroplane mechanics for girls this summer. The Sheffield Scientific School has a course in military aeronautics and many other universities are following the lead.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative



PILOTS

Dana C. DeHart
Edward V. Gardner
Eber H. Lee
John M. Miller
Leon D. Smith
Max Miller
Charles E. Bradley
Lester F. Bishop
Harold T. Lewis
Leslie E. Stancill
Charles Hugh Anglin
John H. Skoning
Earl F. White
Charles W. Lamborn
Frank H. Crozier
Walter H. Stevens

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

New York-Chicago Aerial Mail Started

Washington, D. C.—The Air Mail Route between New York and Chicago was inaugurated on July 1, according to an announcement by Second Assistant Postmaster General Praeger, when the Eastern half of the route between New York and Cleveland was linked up with the Western half from Cleveland to Chicago which has been in regular operation since May 15.

A fast flight was made today from New York to Cleveland at the average speed of 110 miles per hour—a distance of 430 miles. A new fast plane left New York at 5:15 a. m. and flew to Bellefonte, Pa., the first stop, at the rate of 123 miles per hour. Another plane took the mail from there to Cleveland at the rate of 100 miles per hour arriving at 9:30 a. m., Eastern time. The entire distance between New York and Chicago is about 750 miles.

Mail can now be sent by aeroplane from New York, leaving there about 5 a. m., and reaching Chicago about 1 p. m. Planes are changed at Bellefonte, Pa. and Cleveland. The air mail arrives in Cleveland in time to catch the plane leaving there at 9:30 a. m. for a non-stop flight to Chicago. About 12,000 letters a day are taken for Pacific Coast points, and through air mail service from New York to Chicago will advance the delivery of mail for Seattle, San Francisco, Los Angeles and other cities about 24 hours sooner than if sent from New York through by mail. This applies to letters received in New York post office for the 8:40 p. m. train westward.

Air mail from the West for New York and points East is taken on at Chicago and Cleveland. A plane leaves Chicago at 2:30 p. m., arriving at Cleveland at 5:30 p. m. in time to connect with the 20th Century Limited, and the mail arrives in New York about 9:00 o'clock the next morning. This gives the business men about three hours more to dispatch mail from Chicago than if sent by train about noon. An aeroplane leaves Cleveland in the morning at 8:30, taking on all air mail from train connections, and the mail arrives in New York about 1:00 p. m., a stop being made at Bellefonte, Pa., to change planes. This also gives the business men a late night service by train to Cleveland connecting with the morning plane at that point for New York and points East, and advancing mail delivery many hours over that by through train service.

Most of the planes used are remodelled De Haviland fours with Liberty motors. They have a capacity of 400 pounds of mail.

Demonstrations in dropping from aeroplanes in parachutes were given at the College Park Air Mail Field, Washington, this afternoon by Mr. William Linley and Miss Sylva Boyden, the English aviatrix, representing two parachute concerns. The purpose of these demonstrations is to determine their practicability for use in protecting mail pilots in cross country flying in case of fire or other accidents which might make a landing by the plane impossible.

Plaut Merchandise Plane Carries Mail

Newark, N. J.—In connection with the aerial delivery service maintained by the L. S. Plaut Co., between Newark, Asbury Park and intermediate points, official sanction was obtained for carrying aerial mail for the Post Office Department. Two Whitteman-Lewis planes, one a land and the other a seaplane are used in the delivery service to the coastal resorts.

Large Sales of Surplus Aircraft Material

Washington, D. C.—According to an announcement from the Office of the Director of Sales, the sale of surplus war materials for the week ending June 20 for the Bureau of Aircraft Production amounted to $274,563.22. The total sales by the War Department from January 1 to June 20 amounted to $333,712,636.75, representing 79 per cent. of the cost of the original material to the Government.

UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—EASTERN DIVISION

Monthly Report of Operation and Maintenance

MAY, 1919

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND UNIT COST: Gallons of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
														hr. min.				
2	$12.10	$1.08	$67.64	$52.49	$24.81	$83.84	$6.82	$63.78	$5.23	$67.50	$61.25	$446.54	40	1 05	90	2.25	$411.60	$4.96
4	4.58	.50	26.02	52.49	24.81	83.00	2.12	63.78	7.13	67.50	61.25	393.18	15	20	25	1.67	1179.00	15.72
7	44.32	5.25	67.64	52.49	24.61	88.70	30.21	122.74	5.23	67.50	61.25	570.14	137	4 45	476	3.47	120.00	1.19
10	88.64	18.12	67.64	52.49	24.81	88.34	146.72	170.02	5.48	46.24	61.25	769.75	283	23 04	1566	5.53	33.00	.49
11	91.26	17.16	67.64	52.49	24.81	83.84	103.60	118.36	105.61	46.24	61.25	772.26	290	16 08	1112	3.83	47.40	.69
12	111.74	14.49	67.64	52.49	24.81	117.87	180.23	122.47	68.72	46.24	61.25	867.95	362	26 46	1896	5.23	32.40	.45
14	95.60	13.21	67.64	52.49	24.81	105.17	124.76	130.51	21.68	46.24	61.25	743.36	307	19 37	1348	4.39	37.80	.55
15	220.74	37.71	67.64	52.49	24.81	156.77	287.81	150.90	42.22	46.24	61.25	1,148.58	708	45 49	3400	4.80	24.60	.33
17	109.27	20.49	67.64	52.49	24.61	132.47	155.54	130.62	186.34	46.24	61.25	987.16	371	24 18	1872	5.04	40.20	.52
33	30.50	.....	26.01	52.49	24.81	80.83	.....	63.77	5.83	72.50	61.25	417.99	100	.....	.....	.....	.....	.....
38	50.20	7.58	67.64	52.49	24.81	85.99	15.52	63.77	8.28	72.50	61.25	510.03	165	2 17	180	1.09	223.20	2.83
39	16.78	2.00	26.01	52.49	24.81	80.83	.....	63.77	156.33	72.50	61.25	556.77	55	.....	.....	.....	.....	.....
43	.....	3.50	26.01	52.49	24.81	80.83	.....	63.77	4.83	72.50	61.25	389.99	.....	.....	.....	.....	.....	.....
71	75.53	13.87	29.72	52.49	24.81	93.60	30.21	149.07	80.84	50.00	61.25	661.39	234	4 45	388	1.65	139.20	1.70
39364	39.42	4.61	67.64	52.49	24.82	93.83	10.07	85.01	4.95	72.50	61.25	516.59	103	1 35	151	1.46	325.80	3.42
39365	23.46	5.09	29.22	52.50	24.82	101.56	19.39	59.63	.41	72.50	61.25	449.83	69	3 03	240	3.47	147.00	1.87
Total....	$1,014.14	$164.66	$839.39	$839.85	$396.98	$1,557.47	$1,113.00	$1,621.97	$709.11	$964.94	$980.00	$10,201.51	3239	173 32	12744	3.93	$58.78	$0.80

Cost per mile, overhead, $.31; cost per mile, flying, $.17; cost per mile, maintenance, $.32.

OTTO PRAEGER, Second Assistant Postmaster General.

AIRCRAFT RADIO DIRECTION FINDING EQUIPMENT DEVELOPED BY THE NAVY DEPARTMENT

By EDGAR H. FELIX, A., I. R. E.
Formerly Radio Engineer, Signal Corps, U. S. A.

RADIO compass guidance was employed by the NC planes during the trans-Atlantic flight, bearings being taken from a series of destroyers stationed at pre-determined fixed intervals along the route. The instruments used are the result of a great deal of intensive development work on the part of the radio engineers and workers of the Bureau of Steam Engineering of the Navy Department and the results obtained on the flight are evidence of the successful solution of many of the problems of the designs of the radio compass.

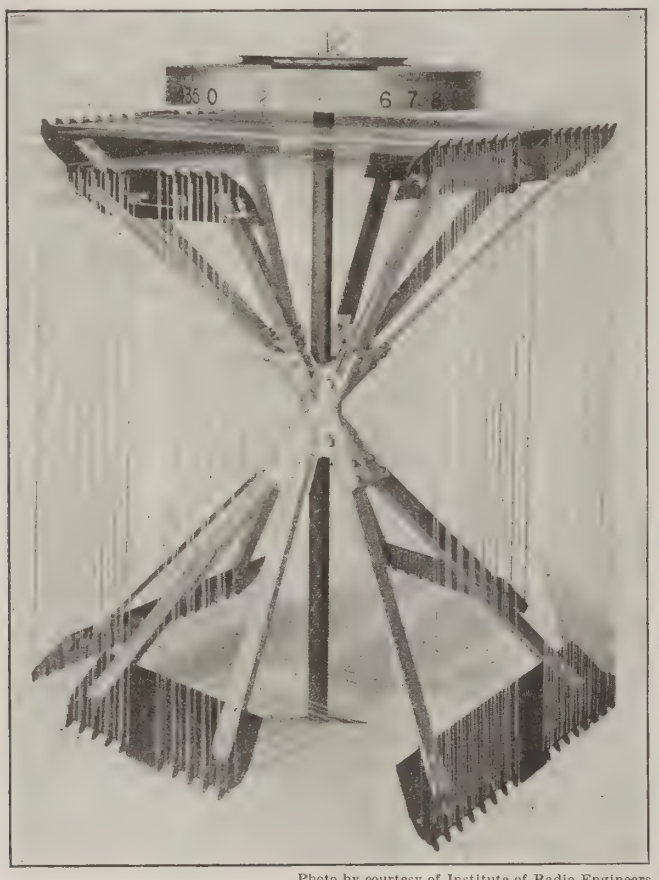


Photo by courtesy of Institute of Radio Engineers

Fig. 1. The loop antenna used aboard flying boats and dirigibles

The importance of radio direction finding aboard large aircraft focused the attention of research engineers upon the solution of this problem early in the war. The possibility of overcoming the shortcomings of navigation instruments and calculations as adapted to aerial navigation, by means of the radio compass made this field of research a promising one.

But considerable modification and improvement of direction finding equipment as known prior to 1914 was necessary before it was possible to safely guide home the long distance bombing squadrons by radio after raids over enemy country. The pioneer permanent land station direction finders, as first developed by Bellini and Tossi, of Italy, involved the use of four antennae radiating in four directions 90 degrees apart from the receiving station at their center. Maximum receiving energy was obtained on the antenna which pointed toward the particular transmitting station being plotted, and if the station lay midway or between the direction of two antennae, the proportion of energy received on the two nearest antennae determined roughly the direction of the station being read.

By the use of two such stations at a considerable distance apart, the location of the ship, acting as the transmitting station could be plotted. Such a system is not accurate, and considerable communication between the transmitting station and the two direction finding stations is necessary.

The installation of four antennæ aboard ships, with the purpose of plotting the direction of two known land stations and determining position by triangulation makes intercommunication unnecessary. The only condition is that the identity and position of the stations on which bearings are taken are known.

Owing to conditions of interference existing in the region of the battle lines and the obvious undesirability of transmitting from a plane in flight over the enemy's lines, making it possible for the enemy by means of their own direction finding equipment to determine the position of the hostile plane over their lines, made the advantage of placing the direction-finding equipment on board the aeroplane so clear that the much more difficult problem of developing a radio compass for installation on board the aeroplane was successfully accomplished.

The use of four antennæ erected at angles of 90 degrees from each other aboard an aeroplane is obviously impractical. Therefore, a loop antenna, consisting of several turns of wire mounted on a frame about a yard square, capable of being revolved in any direction, was first used.

Let us consider the effect the incoming electromagnetic waves have on the receiving loop pointed at various angles from the transmitting station.

By means of a well-known analogy, it is easier to visualize the effect. When a large stone is thrown into a still pond waves radiate in all directions from the point at which the stone entered the water. This corresponds to the transmitting station. At some distance from that point, a stick is floating on the water, at the center of which there is placed a level balance. This represents the radio receiving station. If the stick is pointing toward the "transmitting station," the balance will be set into maximum oscillation by the wave motion imparted to the stick. If the stick, however, is at right angles to the direction of propagation of the waves, although the stick will move up and down, there will be no end to end motion, and the balance will not be affected. The direction which the stick is pointing will determine the strength of the oscillations imparted to the balance, and if the stick can be turned to point at will, the direction from which the waves come can be determined.

In the case of the loop antenna, the electromagnetic waves of the ether will set up electrical oscillations in the loop, if it is so placed that there is a difference of potential between one part of the loop and the other. These are detected by the receiving equipment and the operator, by turning the loop until maximum intensity of signal is obtained, can determine the direction of propagation of the waves.

The curve on Figure 2 shows the amount of energy

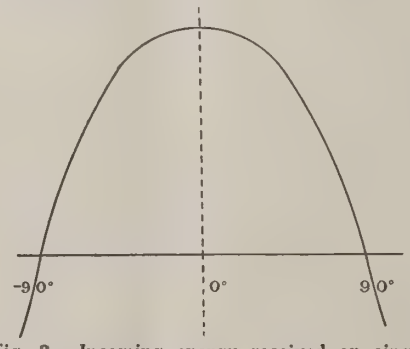


Fig. 2. Incoming energy received on single loop through rotation of 360 degrees

received on the loop at all angles relative to the direction of wave propagation. It will be noted that the curve is a gradual one, and that there is no marked maximum. Therefore, the accuracy of the reading, even with the finest discrimination of a trained ear under condition of absolute quiet, does not reveal within more than 10 degrees the direction of the transmitter. With the loud motor and wind noises and electrical interference due to the ignition system present aboard aircraft in flight, such direction finding equipment is of no practical value.

To overcome these difficulties, the "balanced maximum" method was devised. The following statement of the theory of that system is taken from a paper on "Naval Aircraft Radio" delivered by T. Johnson, Jr., expert radio aide, Navy Department, delivered before the Institute of Radio Engineers at New York on June 4th:

"Referring to Figure 3, if 'ABC' represent a curve of strength of signal as a coil is rotated through 180 degrees

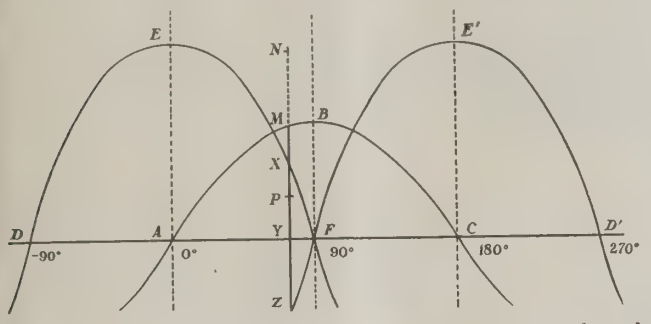


Fig. 3. Incoming energy on two loops 90 degrees apart through rotation of 360 degrees

in a field of radio signals, it will be seen that the maximum is quite flat and could not be detected by the ear within very wide limits. Now let 'DEF' represent the curve of strength of signal for a coil 90 degrees from 'ABC,' or a right-angle coil. When the 'ABC' coil is at some angle, 'OY,' it will have a strength of signal 'YM,' and 'DEF' coil will have a strength of signal 'YX.' Then if the signals 'YM' and 'YX' are added there will be a resultant strength of signal 'YN,' and if they are opposed there will be a resultant strength of signal 'YP.' In other words, if the 'DEF' coil is connected in series with the 'ABC' coil by means of a reversing switch, it can be made to add or oppose its strength of signal to that of the 'ABC' coil. The reversal of the 'DEF' coil is equivalent to advancing its angular position 180 degrees and its curve of signal strength becomes 'FE^{1}D^1.' Then when the 'ABC' coil is at an angle 'OY,' the 'DEF' coil signal strength, 'YZ', is negative, and opposes that of the 'ABC' coil. Thus, when the reversing switch is moved back and forth with the 'ABC' coil at an angle 'OY',' the resultant signal strength alternates in value from 'YP' to 'YN,' to total difference of 'PN,' which is decidedly noticeable. When the 'ABC' coil is at the 90-degree position, the 'DEF' coil has zero strength of signal and no variation in resultant signal strength is obtained by operating the reversing switch. A very sharp point of reference is thus obtained as from Figure 3, it will be noted that as the 'ABC' coil approaches the 90-degree position, there is a large change in value of the 'DEF' coil signal strength for a small change in angle, and this change in signal strength is doubled by the reversing of connection."

Highly accurate readings have been made by the use of properly designed instruments using this method of determination. There is no danger of mistaking cessation of transmission for the minimum signal strength point, and the body of the signal at all points of adjustment is sufficiently strong to overcome the aeroplane noises.

The equipment required to add this type of radio compass aboard a plane after regular receiving equipment has been installed is simple. For this purpose a small control panel, known as type SE 1441-A, was designed, which, together with the antenna loops, is all that is required. In the illustration one of the variable condensers on the panel compensates for the capacity of the auxiliary loop, the other condenser being used to tune the loop to the incoming signals. The reversing switch below the two condenser knobs permits easy change of the auxiliary loop connections until zero signal variation is obtained.

The construction of the revolving coils used on naval aeroplanes is shown in Figure 1. These coils are mounted in the body of the fuselage of flying boats or in the car of the dirigibles. Each set of coils is divided into two equal sections connected in parallel. The illustration shows the type of coil used on the F-5-L boats. The coils revolve in

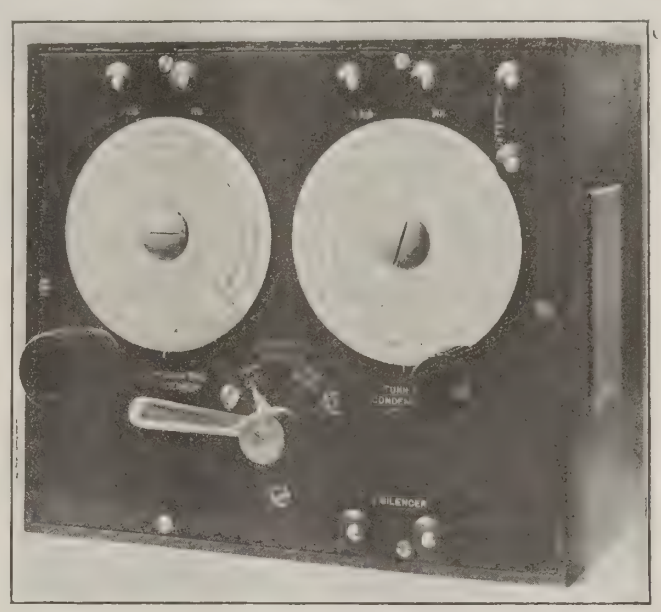


Photo by courtesy of Institute of Radio Engineers

Fig. 4. Type SE 1441-A, for controlling the radio compass

a diameter of 34 inches and stand 34 inches high. The loops used on the NC boats and the C-type dirigibles are forty inches square. The wire used is number 18 B. and S. gauge enameled copper. The ratio of turns on the auxiliary coil to those on the main coil is about two to one.

With the standard SE-950 vacuum tube receiving set and the loops described, accurate readings have been made from the Arlington station at a distance of 300 nautical miles. In a series of tests at Hampton Roads taken with the flying boat at rest on the water, five readings made on the spark station at Swan Island, West Indies, 1,200 nautical miles (2,200 kilometers) distant, were all within 2 degrees correct.

With the advent of the silent aeroplane and more comfortable quarters for the radio operator, more perfect cooperation and organization with beacon stations, and equipment of the type already designed, it is a certainty that the radio compass will be sufficiently developed to guide transatlantic air cruisers to port with the same accuracy and certainty with which navigating instruments now guide ocean liners to port.

ACADEMY OF APPLIED AERONAUTICS OFFERS AERONAUTICAL ENGINEERING COURSES

Chicago, Ill.—The Academy of Applied Aeronautics has outlined a series of very excellent and comprehensive courses, which will be given in a two months' summer school course. The school is located in a four-story fireproof structure with light, airy classrooms, recreation quarters, library, reading and smoking rooms, conveniently located on Lake Michigan, for direct transportation to all parts of Chicago.

The courses offered, embracing the subjects necessary for the Degree of Aeronautical Engineer, are as follows:

Aerodynamics: Development of theory of flight; action of forces on surfaces; laboratory experiments on aerodynamic laws; aerography; present status of aerodynamic research.

Rigging: Principles and details of construction; modern types of aircraft; use and adaptability of different types for commercial purposes; latest improvements in design.

Motors: Principles and operation of internal combustion motors; laboratory work in functions of various types; comparative efficiency of all well-known types; adaptability of different types for use in passenger, freight, or pleasure craft over land or water.

Navigation: Construction of maps by triangulation; charts of the course; meteorological conditions; instruments and their uses.

Photography: Aeronautical cameras; aerial surveying and map making from photographs.

Radio: Use of wireless in communication between land stations and ships in the air.

Economic: Cost of construction; cost of operation, including maintenance and depreciation; comparative costs per hour for different classes of service; overhead and fixed expense.

The duration of the complete course is nine months. The fee is $250. Students who can show that they are proficient in certain subjects will not be required to remain with the school the entire nine months. In such cases arrangements may be made in regard to subjects and terms.

Pilots: Arrangements are also being made for students who desire to participate in flights. These flights will be conducted under the supervision of skilled and highly trained pilots. "Stunt" or dangerous flying is forbidden.

THE BRITISH AVRO AEROPLANES

The Avro Aeroplanes

SOME of the aeroplanes built by the British Avro Company since 1914, and described in "Flight," show the wide range in design and the many purposes for which these machines have been used with success.

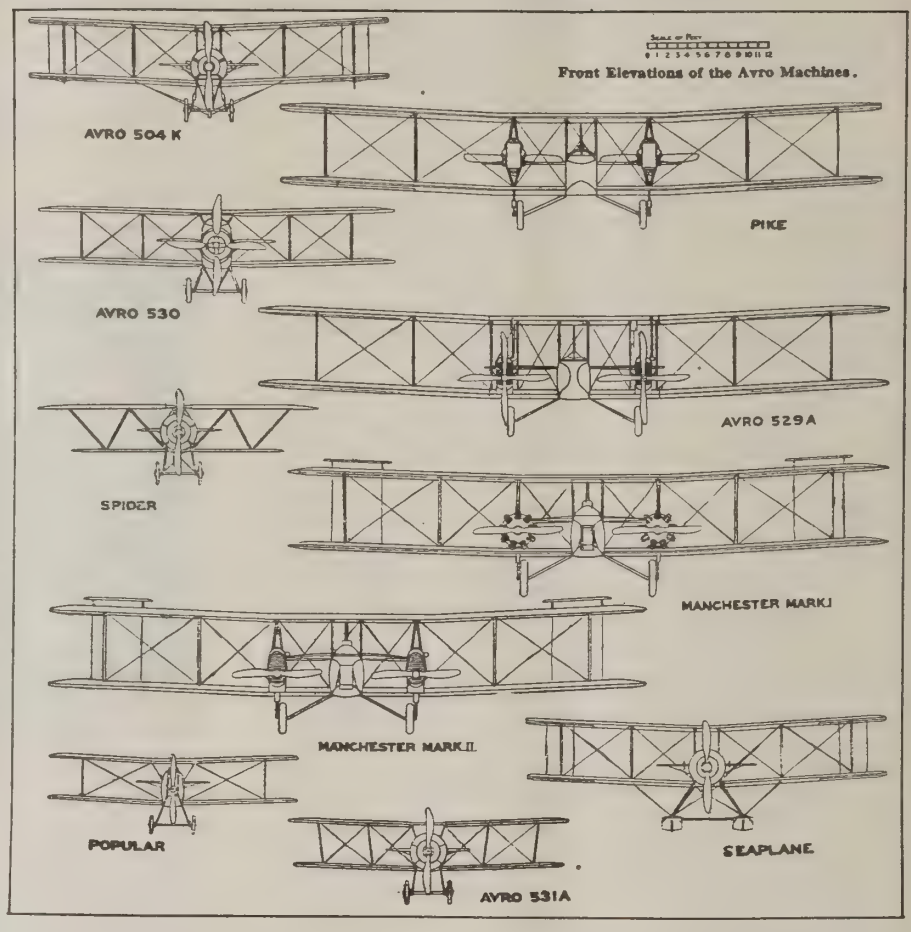
The Type 504 K Training Machine

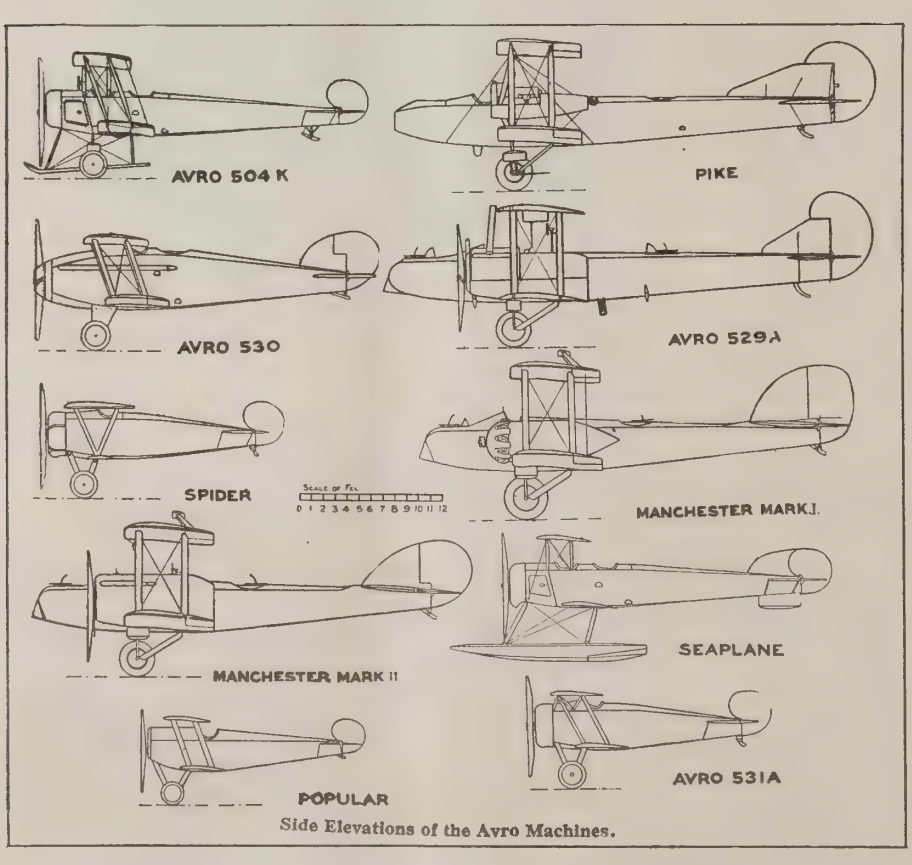
The modern version of the original 1913 type is known as the 504 K, and is to all intents and purposes identical with the original. It has been strengthened up in places, it is true, and minor alterations made, but fundamentally the design remains unaltered. Of the alterations made, mention may be made of the engine mounting, which was, in the older machine, of the two-bearer type, the front bearer being in the form of a ball race supported on four tubular arms forming extensions of the fuselage longerons. This "spider," as it is usually termed, has been removed in the type 504 K, and the engine is supported on two bearer plates behind the crank case—in other words, is overhung. Also the power has been increased from that of the original 80 H.P. Gnome to more modern rotaries, such as the 100 H.P. Gnome monosoupape or the 110 H.P. Le Rhone. In the table of performances printed elsewhere the figures relating to the 504 K represent the performance of the machine when fitted with a 110-H.P. Le Rhone. Any standard rotary engine up to about 100 H.P. can be fitted without entailing any alteration in the machine, adapters being supplied to suit all engines. The A.B.C. Wasp can also be fitted if desired.

Pilots who have flown the Avro 504 K all agree that it is an extremely comfortable machine, and that on it it is possible to do every kind of "stunt" imaginable. The machine appears to be extremely strong in spite of its light weight, and is so easy on the controls that it is not in the least surprising to learn that it has been adopted as the standard training machine for the Royal Air Force. In this capacity it has been built in huge numbers, and it is even probable that more machines of this type have been built than of any other type in the world.

As an inexpensive touring machine for the owner-driver after the war this machine should have much to recommend it, since, even when fitted with an engine of 80 H.P. only, it has a very good performance, and the first cost, as well as the running cost, would not then be unreasonably great. As a matter of fact, we believe that the type is now undergoing further development, and that it is about to be issued in a slightly new form, probably to be known as the 504 M, in which it is arranged as a three-seater, with an enclosed cabin for the pilot and two passengers. This, however, is still a thing of the future, and no particulars can, therefore, be given at present.

It may be remembered that in 1914 the Avro firm got out a tractor seaplane, 150 H.P. Sunbeam engine, for the circuit of Britain. Although the outbreak of war prevented the running of this race, this particular type of machine was proceeded with, and several were built early in 1915. The time between the outbreak of hos-





Side Elevations of the Avro Machines.

tilities and May, 1916, was taken up with the construction, in addition to the standard 504, of 130-H.P. Clerget two-seaters, 130-H.P. Sunbeam two-seaters seaplanes, and several large single-engined bombers. The 504 was slightly altered in various respects for different jobs. Then in May, 1916, tests were carried out on a twin-engined bomber.

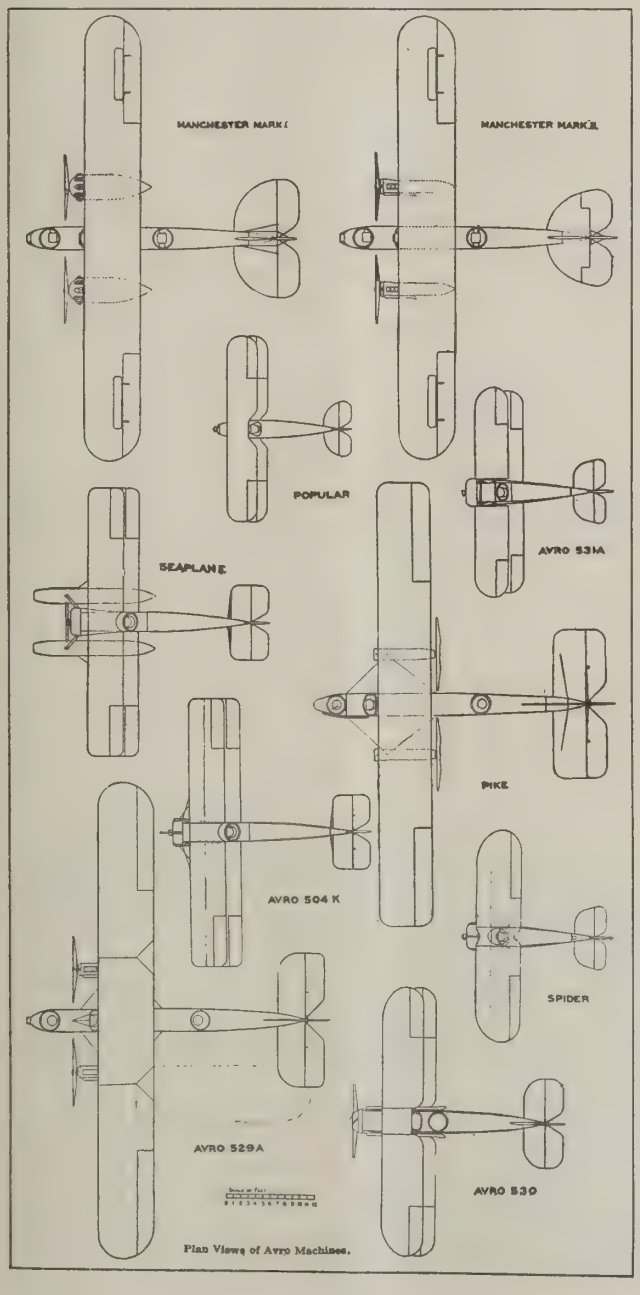
The Avro "Pike"

This machine was the first Avro twin-engined machine to be built, and was intended for work as a three-seater fighter. The general arrangement will be clear from the accompanying diagrams. The pilot occupied the middle seat, while a gunner was placed in the nose of the fuselage, and one well aft, about halfway between the planes and the tail. From the tables it will be seen that the "Pike" had a very good performance, considering that she only had a total horsepower of 320, the power plant consisting of two Sunbeam engines each of 160 H.P. In plan the machine was very similar to the standard single-engined Avros, with rectangular planes and tail, with the corners rounded off. The machine had an adjustable tail, rotatable gun rings, and bomb racks. The pusher airscrews were carried on extension shafts from the engines, and rotated in opposite directions. Considering the time of testing the first machine, May, 1916, and the good performance for its power, it is not immediately obvious why the type was not at once put into production, but the fact remains that it was not, immediately or at any time. The solution does not emerge from the table of performances, which would certainly appear to justify its production in quantities.

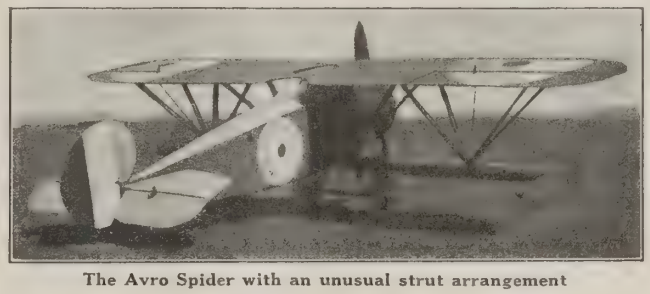


The Avro Manchester, Mark II, with two 250 H.P. Siddeley "Puna" Engines

Contemporary with the "Pike," another machine, which was really her sister 'plane, was going through the works. This machine was, however, fitted with two Green engines of 150 H.P. each. Also the airscrews were tractors instead of pushers. This machine was tested in August, 1916. A third machine on very similar lines, but totally different in detail design, was fitted with two Rolls-Royce engines of 190 H.P. each. This was known as the 520 type, and was first tested in April, 1917.



Plan Views of Avro Machines.



The Avro Spider with an unusual strut arrangement

Avro Two-Seater Fighter, Type 530

In many ways the 530, built in July, 1917, was a radical departure from usual Avro practice. Thus the engine, instead of the rotaries fitted in the type 504 machines, was a water-cooled—a 200-H.P. Sunbeam "Arab." Also the shape of the wing tips was totally different from the usual Avro rectangular tips with rounded corners. As regards the fuselage, this was very much deeper, and of different shape altogether from the ordinary Avro bodies. The object kept in view when designing this machine was to provide as good a view as possible for both gunner and pilot. To this end the body was made very deep, and the pilot was so placed that his eyes were on a level with the under side of the top plane. Similarly the gunner was placed very high in relation to the top plane, being, in fact, able to fire over it. It will be noticed that the attachment of the top plane to the body was unusual. A sort of fin was extended up from the body, covered with



The Avro Seaplane Type 504 L



Avro Aeroplanes—The machine at the left is the Avro "Pike" with two 160 H.P. Sunbeam Engines. The machine at the right is a sister plane to the "Pike", but is fitted with two 150 H.P. Green Engines

ply-wood, to which the center section was attached. Inside this fin was mounted the pilot's machine gun, synchronized, of course, while the gunner's weapon was mounted on the usual rotatable gun ring. The undercarriage was of a simple Vee type, but forming a letter M, as seen from in front, and the two side Vees were enclosed in fabric. The machine was very light and quick on the controls, and the deep roomy fuselage afforded ample space for ammunition, wireless, cameras, etc. From the table of performances it will be seen that both speed and climb were very good indeed for the power, and this is of particular interest in view of the comparatively large cross sectional area of the fuselage—14 sq. ft.—which does not appear to have adversely affected the speed of the machine. Originally the Type 530 was designed for a 300-H.P. Hispano-Suiza engine, but as this could not be obtained the experimental machines were fitted with 200-H.P. Sunbeam "Arabs" and 200-H.P. Hispano-Suizas.

The Three-Seater Bomber, Type 529A.

The reason for the apparent break in the series, by which the two-seater fighter, Type 530, comes before the 529A, is to be found in the fact that these two machines were going through the works at the same time, and the Type 530 was finished a short time before the other machine, October, 1917. The type 529A is a sister plane to the Rolls-Royce engined machine. From the table of performances it will be seen that both speed and climb of this machine were very good indeed, while at the same time she had a good range of action (556 miles at 10,000 ft.). She would therefore have made a good long-distance bomber, and should have been coming through in quantities in the spring and early summer of 1918. From the plan view of the machine it will be seen that the wings were arranged so as to be capable of being folded back, thus economizing storage room. The pilot sat just ahead of the leading edge of the planes, while a gunner was placed in the nose of the fuselage, and another gunner well aft, whence he had a good field for his machine gun. The engines fitted were Galloway B.H.P.'s of 220 H.P. each. The engines were very neatly covered in, and drove tractor screws, running in the same direction.

Table of dimensions of Avro machines.

Type of machine.	Length o.a.	Wing span.		Wing chord.		Wing area Including *ailerons*.			Incidence.		Gap.	Stagger.	Sweepback.	Dihedral.		*Aileron* area.	Area.			Area.		
		Top.	Bot.	Top.	Bot.	Top.	Bot.	Total.	Top	Bot.				Top.	Bot.		Tail-plane.	Ele-vators.	Total.	Fin.	Rudder.	Total.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	square feet.			°	°	ft. in.	ft. in	°	°	°	sq. ft.	square feet.			square feet.		
504K ..	28 11	36 0	36 0	4 10	4 10	171·5	158·5	330·0	4·5	4·5	5 6	2 2	0	2·5	2·5	45·5	26·0	18·0	44·0	0·0	9·0	9·0
"Pike" ..	39 1	60 0	60 0	7 0	7 0	418·0	397·0	815·0	4·0	4·0	7 3	0 0	0	3·5	3·5	122·0	80·0	45·0	125·0	17·5	21·0	38·5
530 ..	28 6	36 0	36 0	5 6	5 6	182·0	164·0	346·0	2·0	2·0	5 0	1 9	0	1·5	1·5	58·0	28·4	23·8	52·2	4·5	8·8	13·3
529A ..	39 8	64 1	64 1	7 6	7 6	465·0	445·0	910·0	2·0	2·0	7 3	0 0	0	3·0	3·0	128·8	48·4	36·8	85·2	10·0	24·5	34·5
"Spider"	20 6	28 6	21 6	6 0	2 6	162·0	46·0	208·0	0·0	0·0	4 2§	2 0	0	0·0	0·0	22·6	15·2	10·4	25·6	0·0	7·8	7·8
Manchester I	37 0	60 0	60 0	7 6	7 6	430·0	383·0	813·0	4·0	4·0	7 3	0 0	0	2·5	2·5	124·0	69·0	38·0	107·0	16·0	18·0	34·0
Manchester II	37 0	60 0	60 0	7 6	7 6	430·0	387·0	817·0	4·0	4·0	7 3	0 0	0	2·5	2·5	124·0	50·0	35·0	85·0	12·0	16·0	28·0
504L ..	32 1	36 0	36 0	4 10	4 10	170·0	160·0	330·0	4·5	4·5	5 6	2 2	0	2·5	2·5	45·5	26·0	18·0	44·0	6·0	9·0	15·0
531A ..	20 6	28 0	27 0	4 6	4 6	106 0	104·0	210·0	1·5	1·5	4 3	2. 0	0	2·0	2·0	29·2	17·5	11·0	28·5	0·0	7·8	7·8
"Popular"	17 3	25 0	25 0	4 0	4, 0	98·0	82·0	180·0	3·5	3·5	4 0	1 4	0	3·0	3·0	27·0	9·5	8·5	18·0	0·0	9·0	9·0

Table of weights, etc., and performance

Type of machine.	Engine.		Weight of machine.		Fuel capacity.	Range (in miles). *	Speed (m.p.h.).			Climb (in mins.) to			Ceiling.	Landing speed.	Load/sq. ft.	Load/h.p.	Military load.
	Type.	H.P.	(empty) lbs.	(loaded) lbs.	hours		Ground level.	10,000.	15,000.	5,000.	10,000.	20,000.	ft.	m.p.h.	lbs.	lbs.	lbs.
504K ..	Le Rh.	110	1,230	1,823	3	225	90	75	65	6.25	16	65		35	5.52	16.5	
Pike (523)	2 S.	320	4,000	6,064	7	616	97	88		9.5	27			40	7.3	15.9	
530..	H.S.	200	1,685	2,680	4	432	118	108		6	14	40†	18,000	45	8.23	13.4	714
429A ..	2-B.H.P.	440	4,361	7,135	5.25	556	116	106	93	7	17.5	35‡		45	7.75	16.2	1,280
Spider(531)	C.	130	963	1,517	3	330	120	110		4	9.5	22‡	19,000	40	7.78	11.6	125
Manchester I ..	2-D.	640	4,079	6,586	5·75	700	128	122	115	4·5	11	40	20,000	45	8·06	10·3	
Manchester II ..	2-P.	600	4,574	7,158	3.75	446	125	119	112.5	6.5	11.5	43§	17,000	45	8.76	11.9	1,074
504L ..	C.	130	1,408	2,006	2	160	80	65		8.5	22.5			40	6.09	18.2	
531A ..	C.	130	960	1,514	3	330	120	110. 5	103	4	9 5	22‡	19,000	40	7.22	11.6	
Popular (534) ..	G.	35	607.5	844.5	3.5	217	70	67‖	62¶	20				30	4.69	24.1	

Le Rh. = Le Rhone. S. = Sunbeam. H.S. = Hispano Suiza. C. = Clerget. D. = "Dragonfly" A.B.C.
P. = Siddeley "Puma. G. = Green.

* At 10,000 ft. † To 18,000. ‡ To 15,000. § To 17,000. ‖ At 3,000. ¶ At 5,000.

The Avro "Spider," Type 531

The following spring of April, 1918, saw an entirely different type of machine issue from the Avro works. This was a single-seater "Scout," in which the wing bracing was along quite unusual lines. From the illustrations it will be seen that, instead of the ordinary wing bracing wires or cables, the "Spider," as this machine was called, had Vee strutts arranged in the form of a Warren truss. In 1917 "Flight" published a series of articles by "Marco Polo," entitled "Wing Bracing and Head Resistance," in which this particular form of wing bracing was dealt with. In this article the author expressed the opinion that although the combination of Nieuport Vee struts and Warren truss did not appear to give the absolute minimum of resistance, it did have a low resistance, while at the same time having the structural advantage that the distance between supports was reduced, thus resulting in a lighter structure, and that therefore the arrangement might be found to be worth trying. This appears to be what the Avro designer has done. The "Spider" was said to be extremely monœuvrable and light on the controls, and the accompanying table of performance indicates that the machine had quite a good turn of speed—120 M.P.H. at ground level with a 130-M.P. Clerget engine is not bad—while the climb was also satisfactory. The pilot was so placed that his eyes were on a level with the top plane, in which a circular opening was cut out. This gave a good view both upwards and horizontally in all directions, while the small chord of the bottom plane gave a minimum of obstruction to downward visibility. The "Spider" might conceivably make a good sporting model, especially if fitted with a somewhat smaller engine, since the fuel bill for a motor of 130 H.P. would probably be more than the majority of owners would care to spend. However, as the machine is light there does not appear to be any reason why, in a slightly modified form, it should not be fitted with, say, an engine of 80-H.P. or thereabouts.



The Avro Type 530 two-seater fitted with a 200 H.P. Sunbeam Arab Engine

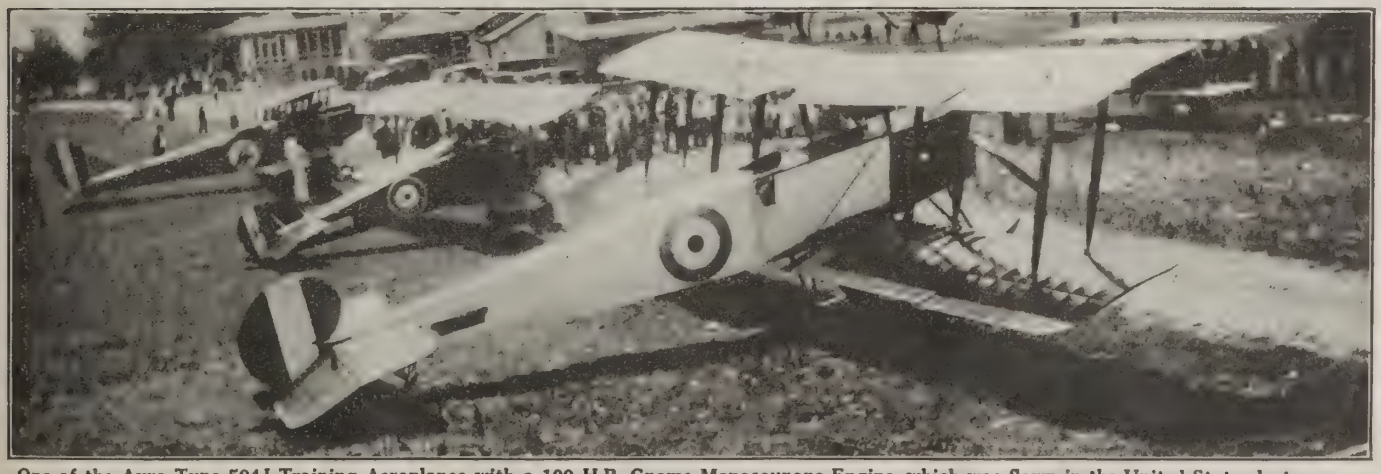
The Avro "Manchesters"

The success which was attained with the earlier model twin-engined machines, from the point of view of performance, encouraged the Avro firm to get out a design for a modern machine of this type, to be an improvement upon previous models chiefly as regards its engines, which were to be of the A.B.C. Dragonfly type, which was by then—we are now speaking of the earlier part of 1918—beginning to go into production, and which had an extraordinary power/weight ratio. With such engines available a very good performance was anticipated, and the drawings for the "Manchester" Mark I were got out. However, it was found that after all the engines could not be obtained, and so a silghtly modified form of machine was designed—the "Manchester" Mark II—which was fitted with two Siddeley "Puma" engines, instead of the two Dragonfly engines originally contemplated. The "Manchester" II was put through its tests in December, 1918, and gave, as indicated in the tables, very good results in the way of speed and climb. The two types of "Manchesters" are very similar, except, of course, as regards the engine housings. As in the previous Avro twins, the pilot occupies the middle seat, with one gunner in front and one in the rear. A feature which will scarcely escape the notice of readers is the unusual arrangement whereby the ailerons are balanced. Instead of the ordinary small forward projection at the outer end of the aileron, now so frequently seen on large machines, the "Manchesters" have a small auxiliary plane mounted on two short struts from the main aileron, and placed slightly ahead of it, so as to produce a balancing effect. The advantages expected from this arrangement are probably structural rather than aerodynamic, since by doing it in this fashion the twist of the aileron leading edge, caused by the usual balance placed at the extreme end of the aileron, is avoided. In some recent German machines a similar arrangement has been tried, but differing in that the small auxiliary plane is below the main plane instead of above it as in the Avros.

More recently the Dragonfly engines have been obtained, and the "Manchester" Mark I tried with them as originally intended, with good results. The "Manchester" II is being fitted with a cabin for passenger and mail carrying, and probably, therefore, more may be heard of this machine later on.

The Seaplane, Type 504L

Quite recently (February, 1919, in fact) a further development of the famous 504 type has taken place. This takes the form of a tractor seaplane with 130-H.P. Clerget engine, very similar to the standard Avro 504 in general arrangement, except, of course, the undercarriage, which is of the twin-float type. This machine is known as the 504L, and is not greatly different from the 1914 type of seaplane. The figures in the table of performances, relating to this machine, are the calculated figures, and we are informed that the actual tests have given even better results. Thus the calculated speed was, as shown in the table, 80 M. P. H. at sea level, whereas the machine actually does 90 M. P. H. The machine, which is fitted with dual controls, can be looped, spun, side-slipped, stalled, etc, just like the standard land machines. The 504L will also be arranged as a three-seater, with single controls and the pilot in front. The airscrew which was used for the test has Avro patent detachable blades. Finally, it might be mentioned that the machine will take all rotaries up to 150 H.P. and also the A.B.C. Wasp.



One of the Avro Type 504J Training Aeroplanes with a 100 H.P. Gnome Monosoupape Engine, which was flown in the United States last summer

NAVAL and MILITARY AERONAUTICS

Army Surgeons in Long Flight

Washington, D. C.—A recent successful flight by Army surgeons from Florida to Washington, a distance of 1,360 miles, was made in 18½ hours actual flying. This was the longest flight made by officers of the medical corps, although a medical officer had previously made a longer trip as a passenger.

The purpose of the trip was to stimulate interest among officers of the medical department in flying. Major S. M. Strong, post surgeon of Carlstrom and Dorr aviation fields, Florida, was in charge of the three airships which made the flight from Florida to Washington. Major Strong is working on an aerial ambulance and is hopeful of perfecting a machine of this type, for real war work, with a capacity of from 2 to 15 patients.

There were two men in each of the three ships piloted from Florida to Washington. Major Strong, with Lt. R. W. Brown, acting as adjutant of the group, were in the first aeroplane; Capt. John H. Timberman, flight surgeon and historian of the trip, and Lt. John Langley, navigating officer, in the second, and Lt. Fred Austin, in general charge of the ships and supplies, and Sergeant H. S. Rasch, mechanic, in the third.

The machines were of the Curtiss type with Hispano-Suiza motors. As flight surgeon, Capt. Timberman made a study of the physical and mental condition of the men making the flight, including expects to make the return trip to Florida their blood pressure and pulse. The party early next week.

Capt. Kindley, Who Downed 12 Planes, Returns on Transport Tiger

Captain F. E. Kindley, of Gravette, Ark., who has twelve enemy planes to his credit, arrived at New York on June 27 aboard the transport *Tiger*. He has the D. S. C. with oak leaf as a decoration from his own country, and the Distinguished Flying Cross from Great Britain, as well as the Croix de Guerre from France. The captain was with the 141st Aero Squadron, of which he had command on the transport. He left the United States on September 16, 1917, as a cadet flyer.

Air Service Instruction for High School Students

Washington, D. C.—The fact that forty high school graduates just completing their work at New York City high schools have enlisted in the Air Service in preference to seeking instruction at technical schools has called the attention of Air Service officers to an excellent field for obtaining recruits of the highest order.

Accordingly an energetic campaign is being prepared to present the opportunities for higher education and technical aeronautical instruction to high school graduates in all parts of the country. A number of aviation officers will be detailed for this work and Educational Boards will be requested to include such an officer as a speaker in the graduation program of public schools.

Bombardment Squadron Ordered to Border

Washington, D. C.—The 96th Aero Squadron, the first American bombardment squadron to see service on the Western front, has entrained for the Mexican border for observation duty on this side of the line. Capt. Cecil G. Sellers, D. S. C., formerly commander of the 96th is in command.

Lieut. Col. H. B. Hersey Discharged from Air Service

Washington, D. C.—Lieut. Col. H. B. Hersey, formerly commanding officer of the Army Balloon School at Fort Omaha, Nebraska, later of the Army Balloon School in France and finally in the Administrative Dept. of the Balloon Division at Washington, has, at his own request been honorably discharged from the service. Colonel Hersey will assume the office of District Forecaster, Weather Service, Milwaukee, Wisc.

Air Service Officers Recommended for Regular Army Commissions

Washington, D. C.—According to an official statement, Class III officers (those who have requested commissions in the regular army) desiring service in the Air Service total 2,297, and recommendations have been made on behalf of 2,297 officers.

Single Wing Insignia to Be Discarded

Washington, D. C.—The Advisory Board of the Air Service has recommended the use of the double wing insignia for all officers who participate in regular and frequent flights. Distinctive insignia for the following ratings are suggested: Aerial gunner, aeroplane observer; aerial bomber and balloon observer. The question of ratings and insignia for dirigible pilots is also being considered.

Distinguished Service Cross Awarded

The Commander-in-Chief, in the name of the President, has awarded the Distinguished Service Cross to the following officer for the act of extraordinary heroism set forth after his name:



The Vickers commercial type "Vimy" machine equipped with two Rolls-Royce 375 H.P. engines. Two pilots are carried in the cockpit placed high in the nose and the cabin has a seating capacity for 10 passengers in separate arm chairs. Fuel is carried for five hours; speed, 110 M.P.H.

FIRST LIEUTENANT WILLIAM P. ERWIN, First Aero Squadron, (Pilot). For the following act of extraordinary heroism in action near Sedan, France, November 5, 1918. Lieutenant Erwin is awarded an Oak Leaf Cluster to be worn with the Distinguished Service Cross awarded him October 1, 1918. Against the advice of experienced officers he undertook a reconnaissance flight in the face of atmospheric conditions that rendered flying most dangerous. In order that his observer might gain the necessary information, he was forced to fly at a perilously low altitude, and was subject to continuous anti-aircraft and rifle fire. When information gained on the flight had been dropped at division headquarters, he circled and returned over the enemy lines, although on the first reconnaissance mission his plane had been repeatedly hit by bullets. Penetrating far into enemy territory, he manoeuvered most skilfully, and with shells bursting near him, flew low while his observer poured deadly fire upon machine-gun nests that had been holding up the advance of our troops. When his machine was crippled by enemy fire, he displayed exceptional skill in effecting a landing upon rocky land within the enemy lines. With his observer, he beat off repeated enemy attacks and fought his way back to the American lines, with information of vital importance to our troops.

Home address: W. A. Erwin, (Father), 814 Fine Arts Bldg., Chicago, Ill.

Army Appropriation Provides $3,260,000 for Purchase of Wright-Martin Plant

Washington, D. C.—The $3,260,000 appropriation for the purchase of the Wright-Martin factory at Dayton and the 1,586 acres of property surrounding it survived all attacks in Congress and remains a part of the appropriation bill, which, from all indications, will be passed in the very near future.

Twelfth Aero Squadron to be Ordered to Border

Washington, D. C.—Orders have been requested of General Menoher for the transportation of the famous Twelfth Aero Squadron to El Paso, Texas, for duty on the Mexican border. The considerations which led to the ordering of this unit, which has just arrived from overseas for discharge, are that since the work required would be that of an observation squadron and that the better plan on account of the rapid demobilization in the United States and the need of thoroughly trained personnel was to send an arriving overseas squadron immediately and then relieve it as soon as competent personnel could be mustered from the training schools throughout the United States.

The Twelfth is in such splendid state of organization that they can operate immediately and the personnel is thoroughly experienced, having served throughout the Chateau-Thierry, Saint Mihiel and Argonne offensives.

Major Reed M. Chambers, an American ace, now commanding the Ninety-fourth Aero Squadron, which was the old squadron of Rickenbacker, made application to be assigned to the expedition in any capacity should it be necessary to utilize the services of a pursuit aviator. At present, however, it is believed that it will only be necessary to use observation planes, which can also be used for firing on the infantry on the ground.

South Americans Enlist in Air Service Here to Aid Home Industry

South Americans are flocking into the air service of the United States Army as a means of acquiring the necessary training for opening an extensive aero industry upon completion of their term of service. Since the beginning of the publicity campaign of the recruiting service a week ago six South Americans have been enlisted at one recruiting office in New York City alone.

Señor Bernardo Plata of Bogota, Colombia, who was one of the recent recruits said: "There are only three nations in South America that have aeroplane facilities—Brazil, Argentina and Chili—and there is now under consideration in Brazil an aero mail route serving Colombia and neighboring states. If this project is carried out it will be a tremendous stride in the progress of South American aviation, but there is no reason why Colombia should not be served by her own sons rather than be compelled to depend on outside interests for development."

First Balloon Company to Serve at Front Returns

Washington, D. C.—The Second Balloon Company, which the Patria brought back recently, was the first American air unit to see service on the western front, having entered the fighting zone in February, 1918. The company, commanded by Capt. I. I. Konig, of St. Louis, was attacked eighteen times and lost five balloons, but suffered no casualties.

Recent Naval Orders

Lieutenant (junior grade) Rodney B. Starr, to naval air station, San Diego, commandant Twelfth naval district.

Lieutenant (junior grade) Guy McKughlin, to naval air station, San Diego.

Lieutenant Earl R. Holmes, to naval station, Anacostia, D. C.

Lieutenant (junior grade) Francis R. McDonnell, to duty, naval air station, Chatham, Mass.

Lieutenant (junior grade) Harold J. Brown, to naval air station, Hampton Roads, Va.

Ensign Jack B. Bradig, to duty, naval air station, San Diego, Cal.

Ensign Carlyle S. Fliedner, to duty, naval air station, Far Rockaway, L. I.

Ensign Edward M. Tileston, to duty, naval air station, Cape May, N. J.

Ensign Byron J. Connell, to duty, naval air station, Rockaway, L. I.

Ensign Alford J. Williams, Jr., to duty, naval air station, Hampton Roads.

Special Orders, 143 to 149, Inclusive

Col. Milton F. Davis is relieved from his present duty in the office of the Director of Air Service, and from active duty to take effect June 30, 1919, and will then proceed to his home.

First Lieut. Philip De Riblet will proceed to Washington, D. C., and report to the Director of Air Service.

Second Lieut. Duncan L. MacIntyre is relieved from duty at U. S. A. General Hospital No. 10, Boston, Mass., and will proceed to Colonia, N. J., and report in person to U. S. A. General Hospital No. 3 for duty.

Second Lieut. Gavin D. Crandall will proceed to Hazelhurst Field, Mineola, Long Island, N. Y., and report in person to the commanding officer for assignment to duty with the 4th Aero Squadron.

Second Lieut. Bennett E. Meyers will proceed to Love Field, Dallas, Texas.

First Lieut. Christopher O. Anderson is relieved from his present duties and will proceed to Washington, D. C., and report to the Director of Purchase, Storage and Traffic for assignment to duty in the Office of the Director of Finance.

The following-named officers will proceed from Rockwell Field to Mather Field, Sacramento, Cal., for duty: First Lieut. Edward V. Wales, First Lieut. Robert Kauch, Second Lieuts. William Goldsborough, Emil C. Kiel, Augustus Goodrich, Eugene C. Batten, Robert O. Weede.

The appointment on May 2, 1919, of Second Lieut. Charles N. Fitts, for the period of the existing emergency by the commanding general, A. E. F., France, as announced in paragraph 28, S. O. No. 122, A. E. F., France, May 2, 1919, to the grade of first lieutenant, Air Service, with rank from May 2, 1919, is confirmed.

The following-named officers will proceed to Hazelhurst Field, Mineola, Long Island, N. Y., and report in person to the commanding officer for assignment to duty with the 4th Aero Squadron: Second Lieut. Earle H. Manzelman, Second Lieut. Charles Y. Banfill.

Paragraph 26, A. E. F., No. 142-O, W. D., June 18, 1919, directing First Lieut. Eugene H. Barksdale, to proceed from Hazelhurst Field, Mineola, Long Island, N. Y., to aviation general supply depot, San Antonio, Tex., is revoked.

Second Lieut. Howard K. Ramey will proceed

(*Continued on page* 866)



Commander A. C. Read, U. S. N., hero of the first trans-Atlantic flight, about to make a flight in a Breguet Bomber, with the famous French pilot, Lieutenant Roget, at Villacoublay, France

FOREIGN NEWS

Bristol Fighter First Plane to Cross Pyrenees Into Spain

London, England.—Major Payne and his observer, Major Coe, earned for themselves the distinction of being the first British aviators to enter Spain by air. Both officers were loud in their praises of the manner in which the Bristol machine had responded to the demands made upon it during the flight.

The journey was not wholly a pleasant one—the weather conditions militated against that—but the Bristol machine forged steadily along through fog and hail and crossed the Pyrenees from France to Spain at a height of about 15,000 feet. A landing was made in the province of Soria, near Madrid.

After spending a few days in Madrid the aeroplane returned to London, and the schedule of the time occupied in the return flight makes interesting reading. Madrid was left at 6.40 a. m. and a descent was made at Vittoria some two hours and twenty minutes later. At 10.30 the journey to Pau was started and that venue was reached at 10.40 p. m. Pau to Tours occupied from 1.55 to 5.20 p. m. and from Tours, which was left at 6.30, the Bristol made a non-stop flight to Hawkinge aerodrome, where the machine landed at 9.45 p. m. The total time in the air during the journey was thus about 11 hours. When one remembers that the last part of the journey was accomplished in the dark the performance amply justifies the admiration with which the aeroplane and its pilot were regarded in Madrid.

Grand Prix de l'Avenir for Aerial Tour Through France Totals 100,000 Francs

Under the title of the "Grand Prix de *l'Avenir*," a trial is being organized in France by the French journal, *L'Avenir*, with the object of demonstrating the practicability of aircraft for touring and transport purposes. It will be held under F.A.I. rules, with the patronage of the Aero Club of France, and be open to competitors of French or Allied nationality using machines of French or Allied construction.

The full distance will be about 3,000 kilometres, and will be flown in six stages. The first will be from Paris to Angers, *via* Rouen, Havre, Deauville and Dinard; the second from Angers to Bordeaux by Romorantin; the third from Bordeaux to Marseilles, the fourth from Marseilles to Lyon *via* Montpellier; and the fifth from Lyon to Metz *via* Strasburg; and the sixth from Metz to Paris *via* Lille. There will be certain controls on this course, details of which will be arranged later. The controls will be open between 7 a. m. and 8 p. m., but no machine will be allowed to start after 3 p. m. The start will be from Paris on August 26, and all machines must arrive in Paris by the closing time on September 1.

Entries must be made to the Aero Club of France before 6 p. m. on June 30, the fee being 1,000 francs, which is returnable on the machine completing the first stage in accordance with the regulations.

The prizes amount to 100,000 francs, and will be divided into two groups of 50,000 francs. The first section will be split up into prizes of 20,000, 15,000, 10,000 and 5,000 francs, which will be awarded according to the general classing, while the other section will be divided into five sets of prizes of 3,000, 2,000 and five of 1,000 francs, to be given on the classification for each of the first five stages.

The general classification will be by a system of marking. A non-stop run will count ten marks, while a machine which is a day late at a control will lose 3 marks. Each landing outside a control will cost one mark, and replacements will be penalized, changing a wheel, propeller, rudder, elevator, etc., costing one mark, a radiator two marks, a cylinder wing, etc., five marks.

Two or three climbing tests will be made before the start to determine the load to be carried. The competitor will declare the weight, and the machine will have to carry this to a height of 3,500 metres above the point of departure within one hour, and on descending, the machine must show the starting weight minus only the weight of the normal amount of fuel and lubricant consumed. When this weight has been decided upon, it will be painted on the *fuselage* or rudder of the machine.

The machine will be stamped and sealed before the start, and spare parts may be sealed also, but they will have to be carried on board.

At least one passenger must be carried, passengers must be over 18 years of age, and weigh at least 65 kilogs.

Bristol Scout Fast Climber

During recent tests at Farnborough with the "Bristol" Scout, type F, some really remarkable results were achieved. The machine, which was fitted with a 315 h.p. Cosmos "Mercury" engine, climbed a height of 10,000 feet in 5 minutes 25 seconds, and at that height attained a speed of 143 m.p.h. A height of 20,000 feet was attained in 16 minutes 15 seconds. Ease of control is one of the outstanding features of this machine, and it may be landed at 49 m.p.h. A notable feature from a constructional point of view is that the ailerons are fitted to the top wings only, and the wing bracing is characterized by center section and interplane struts of "N" formation. The tail unit is entirely of steel and the structure of the whole machine is particularly strong. It is quite a small model with an overall length of 20 feet, a wing span of 29 feet 6 inches, a maximum height of 7 feet 10 inches and a wing area of 260 square feet.

The Austin "Whippet" Aeroplane

For some time the designing staff and the experimental shops of the Austin Motor Co., of England, have been concentrated on the design and manufacture of a single-seater aeroplane which it is hoped will take the place of the motorcycle for demobolized and undemobolized pilots. The price of the machine has been fixed tentatively at about $2,000.

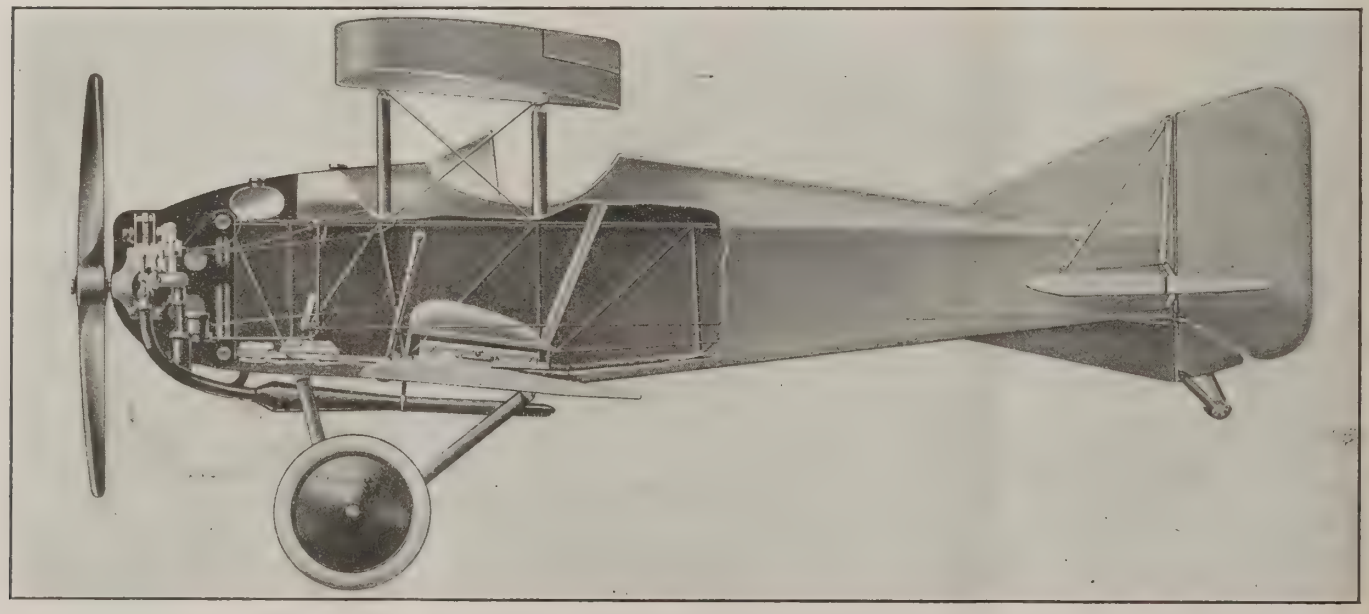
It has been the object of the designers to provide for reliability in the air, slow landing speed, ease of control, simplicity of rigging, small running cost and small housing accommodation. The "Whippet" has been designed with a factor of safety more than twice that adopted in pre-war machines of lower speed.

All fittings are made of a special high-tension steel. Wings have been designed with exceptionally small loading and the landing speed will be about thirty miles per hour, so that it could land on a small field or on a road clear of traffic.

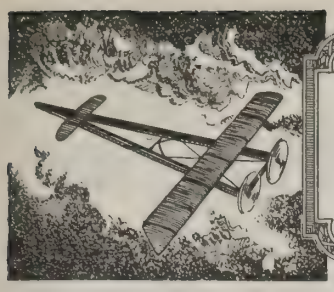
High speed estimated at 95 m.p.h. Inherent stability has been aimed at with good manoeuvrability. As to rigging, the machine has been designed so as to require practically no attention after it has left the makers' hands. In order to obtain this result the fuselage has been constructed throughout of steel tubes and without bracing wires, the wing struts have been made of stream-line tubing and bracing wires have been eliminated and replaced by the tubular members. It is anticipated that a gallon of gasoline should more than cover a thirty-mile flight. In order to get over the trouble of housing, the wings of the machine are made to fold and allow the machine to be stored in a garage 18 ft. by 19 ft. by 8 ft. 6 in. high.

The "Whippet" is a single-seater biplane and should have users in business as well as in pleasure and sport. It has a tractor screw driven by a 45 h.p. twin-cylinder horizontally-opposed engine. Weight, empty, about 500 lbs.; fully loaded, 730 lbs. Its tank capacity is sufficient for a two hours' flight. It should climb to 5,000 ft. in 6 minutes and to 10,000 in 14 minutes.

For starting a small pump is provided for forcing mixture into the cylinders and the pilot starts his machine from inside with a starting magneto. Provision is made to carry luggage under the seat and cowling and wind-screen are arranged to give complete protection from the weather.

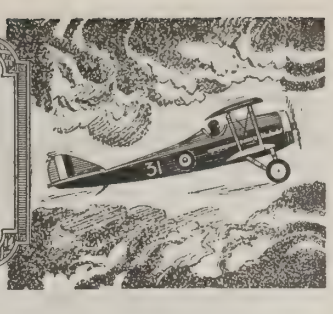


The Austin 45 H.P. "Whippet" biplane which has a speed range of 30-95 miles per hour



ELEMENTARY AERONAUTICS and MODEL NOTES

By John F. McMahon



Model of NC-4 at Hotel Imperial

Mr. J. O. Stack, president of the Hotel Imperial, New York, is in possession of the first scale model of the Navy's NC-4 transatlantic flying boat. This miniature aeroplane is built at a scale of three-eighths of an inch to the foot, and all details, even to the engines, are faithfully reproduced in true scale, so that photographs of the model compare favorably with those of the real machine.

The upper wing has a span of 3 ft. 11 in. and the lower 2 ft. 11 in. Wing chord, 4½ in.; gap between wings, 5 in. to 4½ in. Length overall, 2 ft. 2 in. The hull is 1 ft. 5 in. long, 3¾ in. deep. Span of upper tail plane, 1 ft. 2 in.; lower tail plane, 10 in. Chord, 3⅜ in.; gap between tail planes, 3⅜ in.

Wings and tail planes are painted buff color. Hull, wing pontoons, struts and outriggers are painted with regulation battleship gray. Engine nacelles are painted with alumium to resemble the sheet aluminum covering. Engines are painted black and radiator faces are painted dark gray. Numerals are white and insignia of the Air Service are painted in customary red, white and blue, the red appearing on the outside circle.

The NC-4 model is now on exhibition in the main corridor of the Hotel Imperial, where it attracts a good deal of attention.

Mr. Stack, who is a member of the Aero Club of America, had scale models built of ten of the best known allied aeroplanes and the addition of the NC-4 makes the collection the most complete of its kind.

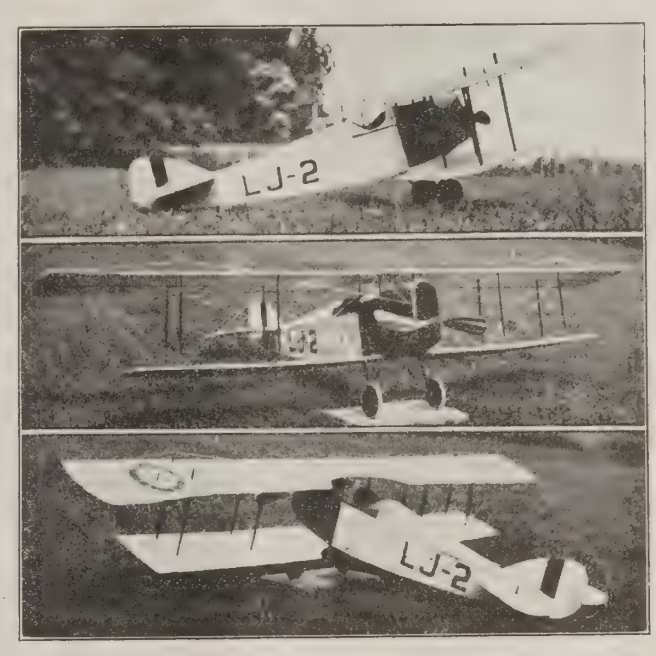
The models were first used at the hotel in a scheme of decoration for one of the banquet rooms, which was appropriately decorated with aeronautic insignia and symbols. During the war this room was converted into an officers' club and was much appreciated by the officers of the Allied armies and navies.

Model of the Holterman Biplane

The model shown in the upper right hand photograph is a perfect copy of the little biplane which was built by Eddie Holterman, ex-civilian instructor and tester for the government at San Antonio, Texas.

This model was made by J. Wm. Batchelder, 14 years old, of Woodstock, Vt., and is complete in every detail, as you can see. This model was built to fly and it is Master Batchelder's intention to power it with a short rubber band motor and a heavier propeller to bring the weight nearer to the nose so that the center of gravity will come at the proper place. As it is now the model is tail heavy and will not fly, but the changes mentioned will correct the balance of the machine sufficient to allow short flights to be made.

It is a mighty hard proposition to get a scale model to fly because of the weight of the tail works and the rubber motor running all the way to the rear, which brings the center of gravity at a point about midway between the trailing edge of the planes and the leading edge of the tail works. Many model flyers have given up model building on account of this, but if they only exercised a little patience and made their propellers heavier and shortened the rubber motor, and, if necessary, added a little lead weight to the nose of the machine so that the model would balance at a point about one-fifth the distance back of the leading edge of the main plane, the model would fly. This would not be correct for a full size machine as the center of gravity is located at about one-third back of the leading edge of the planes, because the



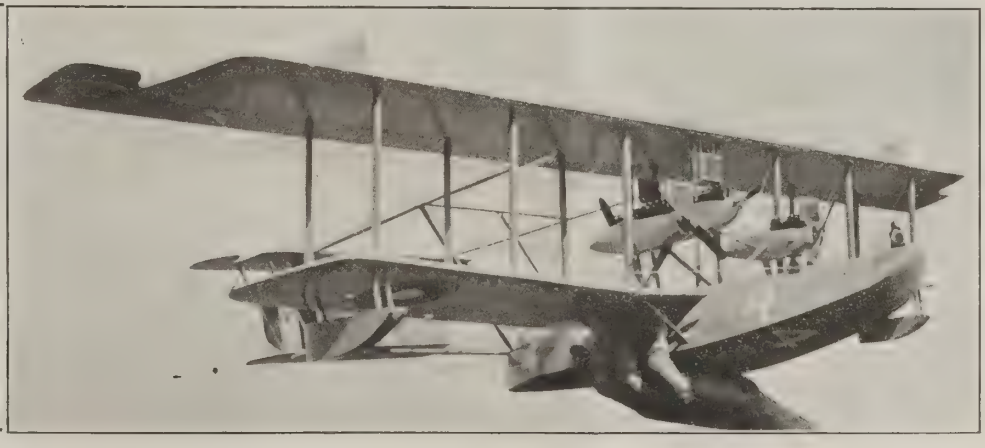
Model of the Holterman Biplane

weight is centered around this point, especially the pilot passenger and the motor, while in a model the weight is distributed the full distance of the fuselage.

Mr. Holterman's little biplane was shown on this page some time ago, and some readers will remember it was powered with a special motor made up of Ford motor parts. This machine had wings of equal spread, but he later found that an increase in surface would help the machine considerable so he decided to increase the top wing span and make it 36 feet. The bottom wing is 26 feet, which makes an overhang of 5 feet.

Master Batchelder has made the model according to the changes and to a scale of 1 inch to the foot. Mr. Holterman's machine was christened the "Lady Jane" so this one is the "Lady Jane, 2nd," as the lettering shows.

An accurate 4 foot scale model of the NC-4 flying boat, built from plans and description appearing in a recent issue of Aerial Age. It is provided with all the details visible in the real machine





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

"Airyplanes" and Women

"A woman is just like an Airyplane," said Pop Jiggs to Maggie, after viewing a flight. "Now what's on your mind?" exploded friend Wife.

"Now keep your Lateral Balance while I Air me views. An Airyplane can't go out at night without a Pilot, can it? No? And neither can a woman; at least not if she cares what the neighbors might say. It takes a durn good Pilot to Steer a High-power woman through Noo York at night. She always wants to Yaw off the Course (usually off the fish course and toward the Port). Fill her Tanks and she's off, losing her Longitudinal Stability, and maybe takes a Nose Dive ending in a Pancake. A good Pilot can prevent this by tugging at her Elevators and warping her Ailerons (or Balancing Flaps). As her Load per square foot increases, she will settle steadily; her Altimeter registers Descent, and her Exhaust decreases from that of a Liberty Twelve to that of a Mercedes Six. On the other hand, however, she may increase her Angle of Attack, causing the Pilot to Bank more heavily or lose Control of her. She Glides around; her Longerons sway; she Floats gracefully to Starboard then to Port; her Flight Path is the shape of a badly coiled Top Rope. A Step, a Stagger, a Strut, a Skid, a Side Slip, a Sweep Back.

"All good Flights must end, the Spirits run out, her Drag increases, she Drifts then Stalls, her Engines won't move her Propellers, she acts as if Doped. It's then the Pilot is most needed to Guide her safely back to Terry Firmy."

G. A. R.

Ace Revere

Listen, my children, and you shall hear
  Of the midnight flight of Ace Revere,
On the 15th of April in seventy-five;
  Hardly a man is now alive
Who remembers the famous flight that year.

He said to his friend: "If the British hop
  From yonder sea to the town to-night,
Send signals aloft from the belfry top
  Of the North Church aerodrome landing site;
Remember you must not fail to see,
  For I on the opposite shore will be,
Ready to hop off and spread the alarm
  Through every Middlesex village and farm,
For Middlesex fliers to fly up with arms."

He has left the village and mounted the steep,
  And beneath him tranquil and broad and deep
Is the Mystic meeting the ocean tides;
  Now over the steeples and over tree tops
He hops and hops and hops and hops
  As his NC smoothly skyward glides.

It was twelve by the village clock
  When he flew o'er little Medford town.
It was 12.02 (hear his motor knock)
  When he sighted little Lexington.
He saw the gilded weathercock
  Swim in the moonlight as he passed;
And the meeting house rooftops blank and bare,
  Gaze at him with a dizzy stare
As if they were quite flabbergast
  At the dips and vrilles they did look upon.

So through the skies flew Ace Revere,
  And down from the clouds came his cry of alarm
To every Middlesex village and farm—
  A cry of defiance and "Look who's here."
A voice in the darkness and signals galore—
  A message that shall echo forevermore;
For born on the night wind of the past
  Through all our history to the last,
In the hour and darkness and peril and need,
  The people will waken and listen to hear
(As they recently followed the flight of Read)
  The Liberty motor of Ace Revere.

—G. W. L. Flushing in the New York *Globe*.



—McKee in the New York "Globe"

(*Continued from page* 844)

soon to attempt the over-seas flight. Officially, New Jersey will be glad to offer any of her facilities in co-operation with the associations endeavoring to arrange for the event, and you have full permission to permit the invasion.

(*Signed*) *Walter E. Edge, Governor.*

Subsequently Mr. Alan R. Hawley, Major Thomas S. Baldwin, U. S. Army dirigible expert, and Mr. Henry Woodhouse visited Cape May Naval Air Station to ascertain whether it afforded the necessary facilities for receiving and mooring the dirigible and whether it was better than the Atlantic City Airport for the purpose. It was found that the grounds available at Cape May were not as large or as suitable as the Atlantic City Airport and that practically all the necessary equipment for handling the large dirigible would have to be provided, as the Cape May station was only equipped to handle small Naval dirigibles. General Charlton was notified to this effect in a letter dated May 23, which he acknowledged under date of May 27, advising that a party of British experts was coming to the United States to inspect available grounds. The letter follows:

From: British Air Attaché, Washington, D. C.
To: Secretary, Aero Club of America,
297 Madison Ave., New York, N. Y.
Re: British dirigible being handled at Cape May Naval Station
Dear Mr. Secretary:

I am in receipt of your letter of May 23 in which you advise me that, after due inspection, Cape May Naval Station, handling the airship R-34; that Atlantic City remains the most convenient spot for their receiving; and that you are proceeding with your general arrangements at the latter place accordingly.

In reply I have to state that a party consisting of two officers and a small number of mechanics sailed from England per S.S. Adriatic on the 28th instant for the purpose of final inspection of reception arrangements. Upon the arrival of this party I will send them, or conduct them personally, to Atlantic City, there to place them in touch with the officials of the Aero Club who are concerned in the matter. I may add that upon the report of this Committee will depend whether or not Atlantic City will fulfill the requirements of the terminus for the voyage, and I have no doubt myself that everything will be satisfactory.

Thanking you for your regards and wishes, and hoping to be able to pay another visit ere long to Atlantic City, believe me,

(*Signed*) *L. Charlton, Brig.-Gen., Air Attaché.*

A meeting was then arranged, consisting of Messrs. Henry Woodhouse, Albert T. Bell, President, and Harry B. Cook, Secretary of the Atlantic City Aero Club, and W. W. Young, to mobilize the 700,00 cubic feet of hydrogen needed to inflate the dirigible. The rest of the equipment required had already been mobilized and everything was ready for the dirigible, excepting the hydrogen.

The Committee found that there were 46 hydrogen plants in the United States, having a capacity of from 8,000 to 60,000 cubic feet daily production capacity. The plants located within a radius of 75 miles of the Atlantic City Airport could supply immediately 3,000 hydrogen cylinders, each cylinder holding 198 cubic feet of hydrogen at a pressure of 1,800 pounds per square foot. They could supply the balance within a week.

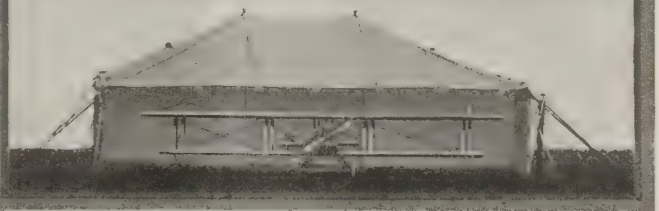
The Committee decided that it would be best to get these hydrogen plants and install them at the Atlantic City Airport as a permanent proposition, and a representative was appointed to go to Washington to get the sanction of the Army Air Service. Mr. G. W. Walton, a friend of a member of the Committee, who had been in the Supply Department of the Air Service, volunteered his services and went to Washington. There a meeting was called, which was attended by Army and Navy authorities and General Charlton, the British Air Attaché. At the meeting the representative of the Navy offered the co-operation of the Navy Department in handling the dirigible which was expected by General Charlton. It was decided that the Navy would supply the hydrogen, the gasoline, oil and mooring facilities at one of the Naval stations. Subsequently it was decided to use the Army Aviation Field at Mineola instead of a Naval station and to have the R-34 handled at the Army Aviation Field.

These arrangements were thoroughly satisfactory to the committee of the Aero Club of America and Aerial League of America, because it was realized that, besides the reasons already given, it would be better to have the event take place under the auspices of the Army and Navy for several reasons, and especially so as to have trained personnel under military discipline for the handling of the ship on the grounds, to avoid possible mishaps.

(Signed) Augustus Post, Secretary.

Portable Hangars for J.N.-4 Curtiss

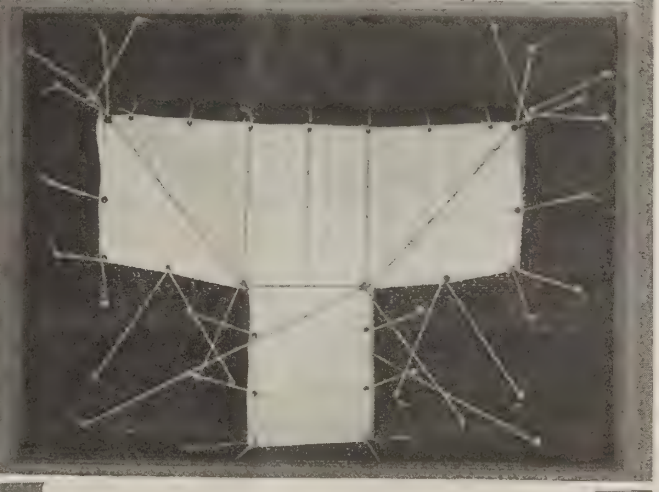
Best of Material and Workmanship.
Fit like the glove to the hand.
Simple as A-B-C



AIRPLANE in hangar. Note room for camp beds at each side under top plane. Front wall closes on cable at top and lashes in center. Non-detachable pegs at bottom make it wind and rain proof.



BALANCE of power for wind resistance through double crossed guys removes strain from any one point and insures perfect safety in storms.



CAREFUL tests of canvas strength have proven the value of rope reinforcement. The heavy guys shown are built into the hangar

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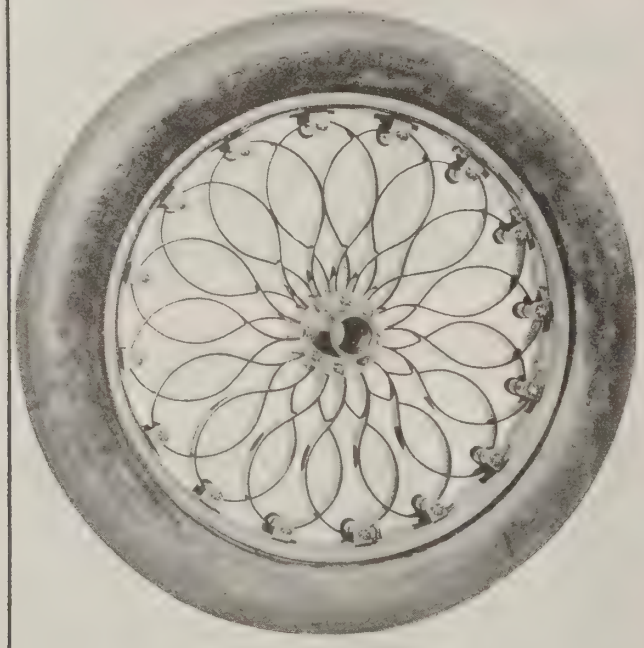
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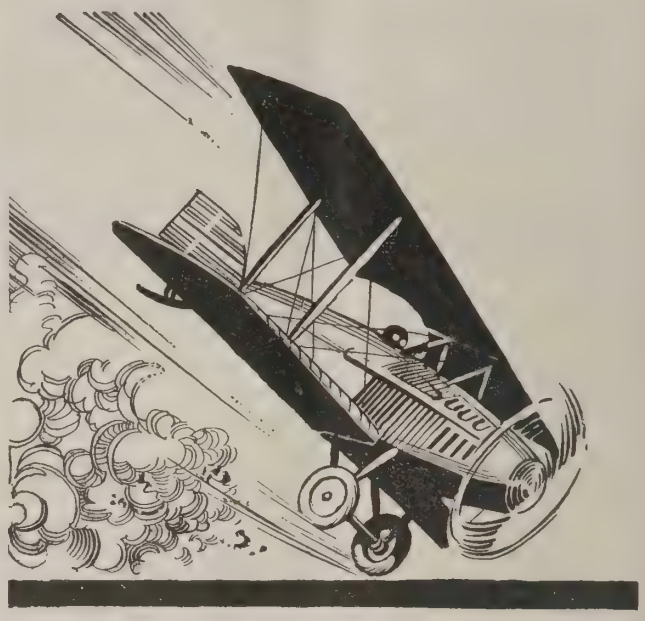


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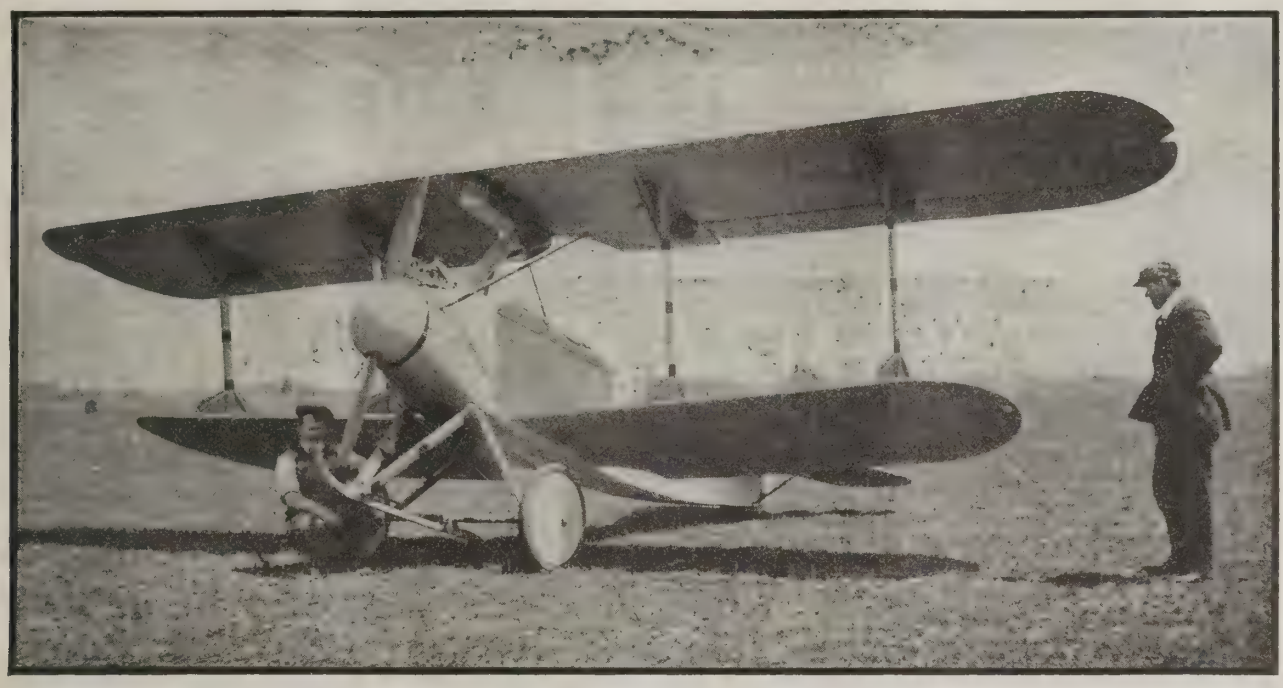
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We make a specialty of AUTOMOBILE policies.



Latest photograph of THE ACE, taken last week at Central Park, L. I. Write for new descriptive folder, containing more photographs and full specifications.

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Horace Keane, Sales Mgr.

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417-9 East 93rd Street

A.W.O.L. Prisoner Returns to Camp in Aeroplane

Stamford, Conn.—Charles Lowden of Stamford, who is in custody here for having overstayed a furlough from Mineola, is destined, according to police announcement, to be the first prisoner to travel as such through the air.

Weather permitting, he is to be transported from the city lock-up here to the guardhouse at Mineola to-morrow in an aeroplane. The young man enlisted recently and crossed Long Island Sound in the aerial ferry established to carry recruits from Stamford to Mineola.

Utz and Swander Now Vice-Presidents of Standard Parts Co.

Dan C. Swander and John G. Utz have been elected vice-presidents of the Standard Parts Co. Mr. Swander will continue as supervisor of sales and Mr. Utz as supervisor of engineering. Both men have been with the company since its organization. Mr. Utz was formerly director of engineering of the Perfection Spring Co. Mr. Swander previously was eastern sales manager of the Firestone Tire & Rubber Co.

Personal Pars

Julian S. Friede, recently released from the British Royal Flying Corps, has joined the engineering staff of the Haynes Automobile Co. Previous to his aviation service he was on the engineering staff of the Paige Detroit Motor Co.

Edward A. Hefferman, recently returned from the naval aviation service, will have charge of the office of the Ahlberg Bearing Co., recently opened in the City Bank Building, Kansas City, Mo.

Doehler Employees Form Benefit Associations

Brooklyn, N. Y.—The employees of the Doehler Die-Casting Co. have formed a mutual benefit association providing for compensation during illness and death benefits. A house organ known as *Doehler Topics* made its first appearance with the June issue.

A New Canvas Hangar on the Market

Canvas hangars built to house eight aeroplanes have been successfully designed and put on the market by the Henrix-Luebbert Mfg. Company of San Francisco, California. One of these hangars erected at Langley Field, Va., at one time withstood a 90 mile gale without being disturbed in the least. It is a remarkable fact that during this gale other hangars built of wood and corrugated iron were damaged to some extent.

A large hangar is now being erected on board a barge to house a flying boat and it is expected that there will be no trouble in keeping the hangar in good order. Hangars have also been designed for dirigibles and observation balloons and the company making them is prepared to undertake the design of a special hangar suitable for free balloons.

All of the Henrix-Luebbert hangars are erected without the use of manila or any other kind of rope, but steel cables are employed throughout, this patented principle being employed because of the difficulty in keeping a canvas hangar rigid when ropes are used which might stretch or shrink according to the weather.

During the War, the Henrix-Luebbert Company employed some 27 blind men and women to do some work in the construction and is now giving employment to returned service men including those who have met with accidents which do not handicap them in the careful performance of their work in this line.

Personal Pars

General George W. Goethals has announced that Mr. C. S. Jennison has been elected vice-president and a director of George W. Goethals & Company, Inc., consulting engineers, New York City.

Electrical Show to Be Resumed

The Electrical Exposition and Motor Show will open at the Grand Central Palace, New York City, on September 24th. Forty per cent of the space has been allotted to exhibitors. This will be the first show since 1917, the 1918 exposition having been omitted because of our entry in the war.

Automobile Tires Advertised and Delivered by Aeroplane

Houston, Texas.—The Aerial Tire and Rubber Co. of this city, distributors of automobile tires, are using an aeroplane for the sale, advertising, and in some cases, the delivery of motor car tires.

Personal Pars

Mr. J. L. Justice, who for the past three years has been associated with the Maxwell Motor Company of Detroit as zone supervisor, has left the Maxwell Company and taken a position as general sales manager of the National Wire Wheel Works, Inc. Mr. Justice will have his offices in the Book Building at Detroit, Michigan, in order to keep in constant touch with all the car manufacturers.

WHY "BELLANCA"?

WHY "ANZANI" ENGINE?

WHY "TWO-SEATER"?

FOR REASONS, SPECIFICATIONS AND ALL INFORMATION :—
MARYLAND PRESSED STEEL CO. (AIRCRAFT DEPT.)
HARRY E. TUDOR, Sales Manager 299 MADISON AVENUE, NEW YORK CITY

(*Continued from page* 859)
to Cooperstown, N. Y., and report to military hospital for treatment.

Second Lieut. William S. Heltzen is transferred with the necessary attendants to Walter Reed General Hospital, Takoma Park, D. C., for treatment.

Capt. Boyd F. Briggs will proceed to Hazelhurst Field, Long Island, N. Y., for duty.

First Lieut. Hugh A. Bivins will proceed to Americus, Ga., and report to aviation general supply depot for duty.

Second Lieut. John V. Hart will proceed to Hazelhurst Field, Mineola, Long Island, N. Y., and report in person to the commanding officer for assignment to duty with the 4th Aero Squadron.

Capt. Charles W. Babcock will proceed to Fairfield, Ohio, and report in person to the commanding officer, Wilbur Wright Air Service depot, for duty.

First Lieut. Henry V. Bell, unassigned, is transferred with the necessary attendants to U. S. A. General Hospital No. 43, Hampton, Va., for further treatment.

First Lieut. Bruce N. Martin, F. A. (attached to Air Service), will proceed to Hazelhurst Field, Mineola, Long Island, N. Y., for duty.

Second Lieut. Franklin A. Plummer will proceed to Camp Pike, Ark.

Capt. Samuel Katzman will proceed without delay to New York City and report to the United States Army recruiting officer, 461 Eighth Avenue, for duty in connection with the recruiting service.

The following-named second lieutenants will proceed to Belleville, Ill., and report to Scott Field for duty: Talcott P. Smith, Frank M. Paul.

Second Lieut. George H. McKay will proceed to Mineola, Long Island, N. Y., and report to the commanding officer Hazelhurst Field for assignment to duty with the 3d Aero Squadron.

First Lieut. Donald C. Bennett is announced as on duty requiring him to participate regularly and frequently in aerial flights from May 30, 1918, to July 31, 1918.

First Lieuts. Charles H. Thalman and Joseph B. Jiskra will proceed to San Antonio, Tex., and report in person to the commanding officer aviation general supply depot for duty.

First Lieut. Kenneth M. Foote will proceed to Dallas, Tex., and report to aviation repair depot for duty.

The rating of Col. Henry H. Arnold, junior military aviator, as military aviator, to date from May 20th, 1919, is announced.

The rating of Lieut. Col. Barton K. Yount, junior military aviator, to date from June 3, 1919, is announced.

Capt. Joseph M. Dawson will proceed to Middletown, Pa., and report to aviation general supply depot at that place for duty.

The rating of Maj. Dana H. Crissy, as junior military aviator, to date from May 20, 1919, is announced.

The appointment on May 8, 1919, of First Lieut. Eugene L. Sullivan, for the period of the existing emergency, by the commanding general, France, as announced in par. 6, No. 128-A, A. E. F., France, May 8, 1919, to the grade of captain, Air Service, with rank from May 8th, 1919, is confirmed.

The following-named officers will proceed from office district manager Air Service Finance, Buffalo, N. Y., to Detroit, Mich., and report in person to the commanding officer Aviation General Supply Depot for the purpose of discharge: Second Lieut. Charles S. Danielson, Second Lieut. Claude F. Griffis, Second Lieut. Paul W. Jenkins.

The following-named officers will proceed to Mather Field, Sacramento, Cal., and report in person to the commanding officer for duty: First Lieut. John P. Van Zandt, Second Lieut. Daniel L. Dargue, Second Lieut. Carlyle H. Ridenour.

Second Lieut. William R. Sweeley will proceed to Rockwell Field, San Diego, Cal., and report in person to the commanding officer for assignment to duty with the 2d Aero Squadron.

Second Lieut. John W. Powell will proceed to Montgomery, Ala., and report to aviation repair depot for duty.

First Lieut. Allan S. Willis will proceed to Fort Bliss, Tex., and report in person to the commanding officer of that post, and by letter to the department Air Service Office for duty.

Second Lieut. Morris L. Tucker will proceed to Scott Field, Belleville, Ill., for duty.

Capt. Cecil G. Sellers will proceed to Columbus, N. M., and report upon arrival, by letter, to the department Air Service officer, Southern Department, for duty.

Second Lieut. Henry H. Sprague will proceed to Hazelhurst Field, Mineola, Long Island, N. Y., and report in person to the commanding officer for assignment to duty with the 4th Aero Squadron.

Second Lieut. Charles G. Brenneman will proceed to Middletown, Pa., and will report to aviation general supply depot for duty.

Second Lieut. Marion L. Elliott will proceed to Hazelhurst Field, Mineola, Long Island, N. Y., and report in person to the commanding officer for assignment to duty with the 4th Aero Squadron.

Second Lieut. Clifford Elleman will proceed to aviation general supply depot, Richmond, Va., for duty.

Second Lieut. Percy O. Brewer, Air Service, will proceed to Camp Normoyle, Tex., and report to the commanding officer motor transport general depot for instruction in Motor Transport Corps duty. Upon the completion of this duty Lieut. Brewer will report to the commanding general Southern Department, Fort Sam Houston, Tex., for assignment to duty.

First Lieut. James L. Rochford will proceed to San Antonio, Tex., and report to aviation general supply depot for duty.

Second Lieut. Hiram W. Sheridan will proceed to Mineola, Long Island, N. Y., and will report in person to the commanding officer Hazelhurst Field, for duty with the 3d Aero Squadron.

By direction of the President, Lieut. Col. D. M. Cheston, jr., is honorably discharged as lieutenant colonel, United States Army, only, to take effect this date.

By direction of the President, Lieut. Col. Milton F. Davis (lieutenant colonel, U. S. A., retired) is honorably discharged as colonel, Air Service only, to take effect June 30, 1919.

Second Lieut. Floyd B. Meisenheimer will proceed to Belleville, Ill., and will report to Scott Field for duty.

First Lieut. Robert S. Houston is announced as on duty requiring him to participate regularly and frequently in aerial flights from January, 11, 1918.

AERIAL AGE WEEKLY

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JUL 24 1919



A 100 H.P. Curtiss "Seagull" Flying Boat. An Un-retouched Photograph Taken from Another Aeroplane.

America to England in Seventy-Five Hours.

PUBLISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY



THOSE practical dreamers who years ago visioned Aerial Mail and Express know now that their hopes are to be fulfilled.

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AMERICA TO ENGLAND IN SEVENTY-FIVE HOURS

CALCULATING by New York time right through, the R-34 started eastward over the Atlantic Ocean at midnight of Wednesday; sailed across the Irish coast in the mid-evening of our Saturday; landed at Pulham, a hundred miles northeast of London, well before the dawn of our Sunday.

To realize the marvel of this performance the exact figures of time elapsed are not needed. Hours and minutes make a statistical record. The R-34 has, in large terms, prepared the way for such a revolution in methods and means of travel as will be quite sure to change completely the relations of land to land, people to people, the world over. So the fourth crossing of the ocean by aircraft becomes the most notable in the series. It marks a close approach to the realization of an old, old dream of man; it goes down as a memorable triumph of mind, heart, courage and imagination.

To comment thus glowingly on the feat of the R-34 and its crew is to shade not at all the earlier transatlantic voyages on the air trail. Pioneer honors remain yet with the American NC-4 and its conductors. For audacity and speed the palm may long be held by the British flyers Alcock and Brown. The note of advance in the case of the great dirigible which has just completed its round trip is sounded over the detail of carrying capacity. For how long or how short a moment we cannot tell, the R-34 brings nearest to a practical basis the matter of establishing a literal airline traffic between continents.

Commenting on his eastward trip, Major G. H. Scott, commander of the R-34, said:

"We estimated we would make the return trip from America in from seventy to eighty hours. We made it in seventy-five. When we left Mineola we had a strong wind behind us, and we covered the first 800 miles in about eight hours.

"When we circled over New York we could plainly see the crowds in Broadway waving to us as we passed, but we could not hear them because of the noise of the engines.

"South of Newfoundland we encountered head winds and our progress from then on was slower. We traveled at an average height of from 3,000 to 5,000 feet and found much low clouds and fog. Once we saw nothing but fog for twenty-four hours.

"We struck Ireland at Clifden and made good progress from there, although our steering engine broke down Saturday morning. We started with 4,900 gallons of gasoline and had 1,000 left.

"We are naturally pleased with the trip, all of us. I expect important changes in the size and speed of future airships, big ships that will travel seventy to eighty miles an hour and powerful enough to crawl through anything."

Colonel W. N. Hensley, Jr., the United States Army observer on board, said:

"This has been a great trip. We were lost one whole day because the fog was so thick we could not get a shot at the sun, moon, stars or horizon. We passed over the Isle of Man about three o'clock this morning and then, mounting above the clouds, witnessed a most beautiful sight. Above was the bright moon; below, soft, fleecy clouds, touched with all the colors of the rainbow, and, far down below, the deep blue of the sea.

"We soon passed over Liverpool and then other cities and towns and here we are. We suffered no hardships and no inconveniences except that we had no hot water for shaving. Our eggs were cooked in the exhaust of the engines, and we had plenty of other good food and coffee, tea and cocoa to drink. No one suffered from airsickness, and while the sea below was tossed by a forty mile gale, we were moving along in comfort on an even keel.

"Regular airship service between Europe and America is bound to come, and soon."

The aeronautic experts assembled at the Atlantic City Airport were enthusiastic over the successful demonstration of the dirigible in its return trip. Mr. Henry Woodhouse, Chairman of the Dirigible Committee of the Aero Club of America and Vice-President, Aerial League of America, who had a prominent part in arranging to bring the R-34 to the United States and inspected the airship while it was at the Roosevelt Field, said:

"The successful return trip of the British dirigible R-34 completes this epoch making demonstration of the fact that airships are ready to operate as fast carriers of mail, express and passengers.

"Especially significant is the fact that the total time elapsed since it left East Fortune, Scotland, and including the stop of the R-34 at the Roosevelt Field, Mineola, only amounts to the time required for a ship of the sea to cross the Atlantic one way.

"For this reason this cruise, like the transatlantic flights of the NC-4 and Captain Alcock and Lieutenant Brown in the Vickers 'Vimy' are in every way as great achievements as the sailing vessel 'Santa Maria' in 1492 and the crossing of the first steamship, the 'Savannah,' in 1819.

"They are the first aircraft to cross the Atlantic in different ways and have opened the way for other aircraft to follow.

"The aircraft used for crossing the Atlantic have all been war craft with only minor changes. In these first trips the airmen have had to face difficulties due to lack of meteorologic data. With improved aircraft and the data accumulated in these first transatlantic flights, the crossing of the Atlantic will not only be easier, but even the stupendous records already made will be greatly improved, and permanent aerial lines for the transportation of mail and passengers will follow."

FIFTEEN GREAT AERIAL CONTESTS WITH CLOSE TO $1,000,000 IN PRIZES

FIFTEEN great aerial contests to come are announced by Mr. Henry Woodhouse, vice-president of the Aerial League of America.

The marvellous accomplishments of aviators during the past two months are to be followed by still greater achievements, Mr. Woodhouse states. The record of Captain Alcock and Lieutenant Brown in flying across the Atlantic in 16 hours, and the record of the French Lieutenant Casale, who flew up to over 33,000 feet, may not be capable of much improvement in the near future, but there are other great things to be done and proper incentive is being given to aviators to do big things.

Among the important events being organized which are to be held under the rules of the International Aeronautic Federation are:

(1) The Aerial League of America's Pioneer Aeroplane Tours, which are to start in the United States, then extend to Canada, Central and South America and other countries.

(2) The Aviation Competition being organized by the Aero Club of France, for which the President of the Club, Henry Deutsch de la Meurthe, has given $400,000.00.

(3) The $25,000 prizes offered by Raymond Ortig for the first flight from New York to Paris.

(4) The $50,000 prize offered by Thomas H. Ince for the first trans-Pacific flight.

(5) The $60,000 Echo de Paris prizes for a 2,500 miles circuit race.

(6) The 100,000 francs prizes offered by the French paper L'Avenir for cross country contests.

(7) The $50,000 prize to the first Australian pilot who flies from Great Britain to Australia.

(8) The $32,400 prize for the Portuguese or Brazilian aviator who flies from Portugal to Brazil.

(9) The International Marine Flying Trophy Race, for best speed over a distance of 200 miles, to be held in England in September, for which a prize of $5,000 is offered to the winner.

(10) The $5,000 prize offered by John McK. Bowman, for a race from Toronto to New York.

(11) The Intercollegiate Aeroplane Contests to be held at Atlantic City this summer for prizes offered by the Aero Club of America under the terms of the will of Mr. Samuel Valentine.

(12) The contests for National and International Aerial Shooting Championships.

(13) Seventeen entries and $10,000 in cash prizes and trophies are already assured for the aeroplane flights from Toronto to New York which are to feature the Canadian National Exposition to be opened by the Prince of Wales on August 25, it was announced tonight.

So far all entries for the Toronto-New York race are from the United States, but twelve Canadian entries are expected before the exposition opens. Captured German Fokker planes, now in the possession of the Dominion Government, will be admitted to the contests, it has been decided, provided their pilots hail from allied countries. There are twenty-two of these craft here now.

(14) The London Daily Express offers a prize of £10,000, open to the whole world with the exception of the late enemy countries, for an air flight establishing communication on a commercial basis with India and South Africa. All competing machines must carry a useful cargo of at least one ton on both outward and homeward flights.

Factors to be considered in the award will be the average reliability and airworthiness of the machines.

(15) Gabriele d'Annunzio, poet and aviator, has arranged to attempt a flight from Rome to Tokio and return. The trip will last altogether a month, and the aviator purposes to cover about 20,000 miles.

The route will lay through Asia Minor, India, Tonkin and China to Japan. D'Annunzio has arranged for stations along the route where he can replenish his supplies.

These contests, held under the rules and regulations of the International Aeronautic Federation, are open to all pilots holding a Federation pilot certificate, which is issued in the United States by the Aero Club of America, 297 Madison Avenue, New York City.

HAVE ANY MERITORIOUS CASES BEEN OVERLOOKED?

THE Aerial League of America has awarded Diplomas of Merit to Commander A. C. Read, the hero of the trans-Atlantic flight; Flight Lieutenant Stone and the other members of the crew of the NC-4, and Commander John H. Towers, Commander P. N. L. Bellinger, Commander H. C. Richardson, and the other members of the crews of the NC-1 and NC-3, and Commander R. E. Byrd, who invented the Byrd sextant.

Major-General Mason M. Patrick, who was chief of the U. S. Air Service overseas during the war, now the U. S. Army representative on the Aeronautical Commission of the Peace Conference; Rear-Admiral D. S. Knapp, U. S. Navy representative on the Aeronautical Commission of the Peace Conference; Brig-Gen. Theodore C. Lyster and Lt.-Col. I. H. Jones, who were foremost in organizing the Air Medical Service; Col. Halsey Dunwoods, executive officer of the U. S. Air Service overseas; Col. E. Lester Jones, Col. Charles Elliott Warren, Col. B. J. Arnold, Col. Thurman W. Bane, Col. C. G. Edgar, for exceptional services rendered to the United States during the war; Col. C. C. Culver, who developed the radio telephone; Lt.-Col. A. R. Chrustie, Lt.-Col. W. G. Kilmer, for exceptional efficiency while in charge of the U. S. Army Aviation centers in France; Col. Charles De F. Chandler and Col. Frank P. Lahm, for exceptional efficiency while in charge of the U. S. Army Balloon Service in France; Maj. J. C. McCoy, Maj. Thomas S. Baldwin and A. Lee Stevens, for exceptional efficiency in organizing the U. S. Army Balloon Service; Capt. Charles J. Glidden, for exceptional services rendered in recruiting for the U. S. Army Air Service; Maj. John M. Satterfield, for exceptional efficiency in connection with the administration of the Air Service in France during the war.

Every one of these men well deserved the honor conferred on them by the League. It would take pages to relate the extent of their achievements.

The League is considering the award of the Diploma of Honor to other officers in the Army, Navy and Marine Corps Air Service and to others who have rendered valuable services to the cause of civilization and humanity. The secretary of the League states that it is the League's desire not to overlook deserving men who should receive the diploma, which has also been awarded to all the aces, and to the parents of all those who lost their lives or were injured while in the service during the war. Readers of AERIAL AGE are requested to advise the League of any deserving case that may have been overlooked. Address the secretary, Aerial League of America, 280 Madison Avenue, New York City.

By these awards the League is rendering another service of national importance. The least the country can do to those who served faithfully and made sacrifices to help to bring the war to a successful end is to show its appreciation.



The News of the Week



New Army Airship in 407-Mile Test

Starting from Akron, Ohio, at 10 o'clock July 11, the new army dirigible A-4, flying against strong head winds, reached Bolling Field, Washington, at 9:45 a.m., July 12. After a stop of an hour and a half the airship rose again and started for Langley Field, Hampton, Va., where she arrived late July 12.

Reports to aviation headquarters said the dirigible covered the total distance of 407 miles in eighteen hours, flying time, at an average speed of a little more than twenty-one miles an hour. Heavy fog was encountered throughout the first lap of the journey, necessitating flying at a height of 4,000 feet. Lieutenant G. W. McEntire was in command, and had two assistants aboard.

The A-4 is 162 feet long and 33 feet in diameter. Its cubic contents are 95,000 feet. It has a total lifting capacity of 6,460 pounds.

Throngs See NC-4 in Park

Crowds of people have visited the NC-4, first transatlantic-air-cruiser, which is on view in the Sheep Meadow, Central Park. The flying boat is in a roped inclosure and a guard is established to prevent the spectators from surging in upon it.

The exhibition of the plane in New York probable will end August 1. Then the machine will be taken apart for shipment to Washington, where it will be reassembled and mounted at the Smithsonian Institution.

Raymond Ware Marries

While Miss Catherine Munroe Schurman, eldest daughter of President Schurman of Cornell University, was being married in Sage Chapel on July 12 to Raymond Ware, of the Thomas-Morse Aircraft Corporation, a squadron of aeroplanes soared back and forth over the church. Dr. Henry Van Dyke of Princeton officiated at the wedding.

Charters Seaplane to Catch Steamer at Sea

Chartering a seaplane at $1 a minute for a flight to catch the steamer Kaisha Maru, which he missed when the vessel sailed from Seattle for Oriental ports, J. J. Mayer, Seattle Red Cross worker, booked for Vladivostok, succeeded in catching up with the ship near Port Townsend, Wash., after a thirty-five minute flight.

Aviators 20,000 Feet in Air Saw Two Sunsets in a Day

Seeing two sunsets in one day was the experience of two army aviators at Arcadia, Fla., in an altitude flight on July 10.

Leaving Carlstrom Field after dark, in an experimental flight for altitude, Lieutenant Charles C. Chauncey and Sergeant Thomas Cook soared in a Le Pere aeroplane to a height of 20,000 feet. The weather at the height was clear, the thermometer in the rear cockpit registered five degrees below the freezing point, and the sun was sinking below the western horizon.

First U. S. Airplane Flies Into Canada

Armed with the first permit ever granted by the Canadian military authorities for an aeroplane flight across the international boundary, two American aviators arrived July 12 on a "courtesy visit" to the Aerial League of the British Empire, Montreal Branch.

The visitors, Lieut. O. S. Parmer and Ensign G. D. Garmon, flew from the Junior Camp at Plattsburg, N. Y., covering forty-five miles through a heavy rainstorm in fifty minutes.

Buffalo to New York in Five Hours

Roland Rohlfs, experimental pilot for the Curtiss Aeroplane and Motor Corporation, flew from Buffalo to New York on July 10 in a Curtiss Oriole three-passenger aeroplane in five hours and two minutes, thus making the trip in almost half the time of the Empire State Express.

From Buffalo to Albany Mr. Rohlfs averaged 100 miles an hour. Below Albany, where cross winds were encountered, the speed was reduced to sixty miles an hour.

The flight was made for the purpose of carrying to New York in time for the dinner given by Glenn H. Curtiss to the commanders of the transatlantic seaplanes at the Commodore Hotel, Thursday night, 200 copies of a history of the flight which were printed too late to catch the train from Buffalo. The books reached Garden City at half-past six o'clock in the evening and were delivered soon after the diners sat down.

Mr. Rohlfs will attempt in the next few days to beat the world's altitude record of 33,136 feet.

Aerial Board in Paris Announces Air Rules

Principles to govern aerial navigation, already accepted by most of the Allied Nations, have been announced by the Aeronautical Commission of the Peace Conference, which recently ended its work. These principles are contained in an international convention which provides for the creation of an international commission. The principles laid down concern the nationality of airships, certificates of navigability, rules for flying, lists of forbidden routes, steps to be taken by all signatory nations to develop aerial navigation, various provisions governing the licensing of aviators, equipment of aeroplanes with signals, distribution of weather reports and customs regulations.

Madam Petrova in Aerial Contest

Having become so greatly enthused over aeronautics since her first visit to the Atlantic City Airport a month ago, Madam Olga Petrova, the noted Russian star of the screen and the speaking stage, paid a second visit to the Atlantic City Airport on July 10.

Accompanying Madam Petrova was Mr. Jules Aaronson, managing director of the Keith theater interests in Atlantic City, where Madam Petrova in playing a return engagement.

Madam Petrova has become so enthusiastic over aviation from a sporting and commercial standpoint that she challenged Mr. Aaronson to a race of twenty-five miles for a wager of $1,000, and great interest centered in the contest which was witnessed by a large assemblage of spectators, including over a thousand prominent Elks from all parts of the country who are in Atlantic City attending the Grand Annual Elks' Convention.

The race started at eleven o'clock from the Atlantic City Airport and was over a course of twenty-five miles along the beachfront, where it was witnessed by thousands of cheering promenaders on the



Madame Olga Petrova, noted Russian star of the screen and speaking stage; Mr. Jules Aaronson, Managing Director of Keith's Theatre interests in Atlantic City; Captain Marucus, Medical Service, U. S. A.; Mr. Mark Ovenden, of the Executive Staff, Atlantic City Airport, and prominent Elks attending Annual Elks' Convention in Atlantic City, in front of Aerial League of America Clubhouse on Atlantic City Airport, just after Madame Petrova's aerial race of 25 miles with Mr. Aaronson, for a wager of $1,000

Boardwalk, where the interest in the outcome ran high. Mr. Aaronson covered the distance in 18 minutes and 30 seconds, with Madam Petrova a close second, finishing in 18 minutes and 42 seconds.

The interest shown by prominent Elks who witnessed the race and who attended the special aerial program, held on Elks' Day, July 9, augers well for the rapid advancement of aeronautics, as the lodgemen are from all parts of the United States and include in their number Governors of States and high Government officials, many of whom complimented the officials of the Airport on its up-to-date facilities for the receiving and housing of aircraft and predicted that the very near future would see the aeroplane in the role of an absolute necessity in the commercial world.

Aerial League to Collect Meteorological Data

Having been advised by the officers of the British dirigible and Army and Navy officers the frequency of transatlantic aerial cruises depends on the building of suitable hangars and making available meteorologic data regarding prevailing winds and other aerologic data, the Aerial League of America has taken steps to collect this data and establish a center where air navigators can gather all the information available on the subject.

The Committee of the Aerial League who visited the Atlantic City Airport decided that the Airport is the most favorable place to establish such a station, and arrangements are being made to use one of the buildings at the Airport for this purpose.

The Aerial League of America will cooperate with the U. S. Weather Bureau, the Coast and Geodetic Survey, the Army, the Navy, the Post Office, the Aero Club of America, and other Government and scientific and aeronautic organizations interested in the development of science of aeronautics.

The Aerial League has already gathered at the Airport an extensive collection of transatlantic flights' data, including photographs and reports and charts of all the transatlantic flights made or planned. This includes about fifty photos showing the NC seaplanes and the Vickers-Vimy taken in different stages of construction and at different periods during the transatlantic flights.

The committee which will supervise the work of collecting this data includes the following prominent aeronautic authorities: Rear Admiral Robert E. Peary, Major Thomas S. Baldwin, Henry Woodhouse, vice president, Aerial League of America; Colonel E. Lester Jones, Director Coast and Geodetic Survey; Colonel Charles Elliott Warren, Captain Robert A. Bartlett, John Hays Hammond, Jr., Albert T. Bell, Brigadier General Theodore C. Lyster, Colonel Isaac H. Jones, Lieutenant Lawrence B. Sperry, U.S.N., Captain Granville A. Pollock, Rear Admiral Colby M. Chester, and G. Douglas Wardrop.

Cleveland Aviation Club Entertains N-C Crew

The Cleveland Aviation Club entertained the crew of the N-C-4 at the Yacht Club, Cleveland, on July 14. Ensign Rodd, who is a native of Cleveland, was presented with a loving cup. The meeting was a most enthusiastic one.

Aero Club of Iowa Formed

Capt. James Normal Hall, of Colfax, Iowa, has been named honorary president of Aero Club of Iowa, recently organized at Des Moines, at a luncheon attended by a score or more of Iowa aviators. A campaign has been started to secure the names of the many flyers in the state who have received their pilot's training both in this country and on the other side.

Officers of the new organization were chosen as follows: Clarence M. Young, president; Dale Griswold, vice-president; Harvey Ray, secretary, and Howard C. Eales, treasurer. An advisory board of prominent and influential men from various parts of the state will be named. Several state officers, including Governor W. L. Harding, have expressed their desire to become affiliated with the organization.

The Iowa club promises to be a live organization and already a number of movements for the promotion of commercial aviation have been launched. One of the first steps to be taken up will be the establishment of municipal landing fields. Several commercial aviation enterprises have been started in the state, and a number of other projects are under way.

Elks Visit Atlantic City Airport

Close to ten thousand Elks from all parts of the United States and members of their families visited the Atlantic City Airport, the first airport in the world, on July 9 and witnessed an elaborate program of aerial acrobatics arranged for their special benefit by the officials of the Atlantic City Airport.

The main event of the day was a spectacular demonstration of aerial mail dropping by means of parachutes from a speeding aeroplane.

To demonstrate with what ease and accuracy mail can be dropped over aerial mail stations or landing fields, Lieutenant R. L. Dunn, late of the U. S. Army, piloted his Curtiss type aeroplane to a height of over 2,000 feet above the Airport, with two parachutes, each having attached a twenty-five pound weight, representing the average bag of mail, and Mr. R. E. Shinn, one of the assistant secretaries of the Airport released the parachutes, which landed perfectly within a hundred feet of the spot selected. The remarkable value of this demonstration lies in the fact that this was Mr. Shinn's first flight in an aeroplane, and he had absolutely no previous experience in handling parachutes of any kind. This proves the efficiency of this means of delivering mail and demonstrates clearly the accuracy with which present day types of parachutes can be handled by even those inexperienced in their use.

The huge delegation of Elks was very enthusiastic over the entire program, and over 250 made flights over the city after the program was completed.



A view from above, showing the comfortable seating arrangement for 4 passengers in the "Airco 16" aeroplane

Flyers in Four Machines to Survey Million Acres of Labrador Timber

A commercial aerial expedition that will revolutionize the work of forestry survey and land photography, according to its managers, was announced by Captain Daniel Owen, until recently of the Royal Air Force. He said a fleet of four aeroplanes would leave Battle Harbor, Labrador, under his command, and would survey one million acres of forest and timber land along the coast of Labrador. The work is being done for a syndicate of Boston bankers.

A steamship left Annapolis, Nova Scotia, carrying forty men, who will comprise the aeroplane expedition. Captain Owen also went to Battle Harbor. The four aeroplanes are awaiting the force there.

"This has never been attempted before," Captain Owen said. "We will do as much work in this way in six days as we could do in the regular way in four or five years. All of the pilots excepting myself will be Americans recently discharged from the United States Army. The planes will be Canadian training machines."

A staff of physicians, headed by Dr. Irwin Tiss, of Ashland, Mass., will accompany the crew, with a full commissariat.



AERO CLUB OF AMERICA AND QUEENSBORO CHAMBER OF COMMERCE EXTEND LUNCHEON TO NC FLIERS

At the luncheon given by the Aero Club of America and the Queensboro Chamber of Commerce, at the Waldorf, on July 10, the Gold Medal of the Club was presented by Mr. Alan R. Hawley, President, Aero Club of America, to Lieutenant-Commander Albert C. Read, U. S. N., for the first trans-Atlantic crossing by air, and the Aviation Medal of Merit of the Club was given to the commanders of the NC-3, Commander John H. Towers, U. S. N., and Lieut.-Comdr. P. N. L. Bellinger, U. S. N., Commander of the NC-1 and to the members of the crews of all of three flying boats.

The Honorable R. A. C. Smith acted as Toastmaster and among those present were: His Excellency the Baron d'Estournelles de Constant and his son, Lieut. Paul d'Estournelles de Constant; Brig. General L. E. O. Charlton, British Air Attache; Lt. Col. W. Lucas, R. A. F.; Lt.-Comdr. Zachary Lanedowne, U. S. N.; Alan R. Hawley, President of the Aero Club of America; Comdr. John H. Towers, U. S. N.; Lt.-Comdr. A. C. Read, U. S. N.; Lt.-Comdr. P. N. L. Bellinger, U. S. N.; Glenn H. Curtiss, Congressman F. H. LaGuardia, Capt. Carlo Tappi, Italian Air Mission; Hon. Samuel Fairchile, Hon. Maurice Connolly, Borough President; Frederick A. Wallis, Fourth Deputy Police Commissioner; Colonel G. C. Brant, Admiral B. A. Fiske, Henry Woodhouse, Chas. Jerome Edwards, Augustus Post, Professor Chas. Lane Poor, Capt. R. A. Bartlett, Capt. Pierre Bosc, French High Commission; Col. Jefferson DeMont Thompson, Chairman, Luncheon Committee; Robert Graves, V. I. Brandon, Richard Wightman, William Morrow, G. Douglas Wardrop, Evan J. David, Norman E. Jennett, H. B. Childs, E. V. Hazelton, G. F. McLaughlin, etc.

Lieutenant-Commander A. C. Read recounted the thrilling experiences which he went through on his epoch marking flight.

Commander John H. Towers and Lieut.-Comdr. P. N. L. Bellinger both related the story of their experiences and His Excellency the Baron d'Estournelles de Constant, of the French Senate, President of the Aviation Committee of that body, spoke about the recent developments in European aeronautics and how much the crossing of the Atlantic has assisted enthusiasm for establishing transportation lines throughout the world.

The Honorable Fiorello LaGuardia, Member of Congress and Major in the Air Service, spoke about the great future for America in the air and the need of wise legislation to control and to speedily develop this great agent for the good of civilization.

The AIRCRAFT TRADE REVIEW

Curtiss Secures Large Order

The largest peace-time order for aeroplanes was placed recently by the Curtiss Aeroplane and Motor Corporation with its Buffalo plant.

The order calls for the building of 225 planes—both land and water—and 200 motors. One hundred and fifty of the planes will be the new Curtiss Orioles, the new three-passenger land machine which has already attracted world-wide attention, and seventy-five Curtiss Sea Gulls, the MF boat equipped with a higher-powered motor and changed in hull construction to admit of two passengers and a pilot. The motors are the new Curtiss 150 horse power motor. These motors, which will be the motor equipment for the Orioles and Sea Gulls, have a fuel consumption performance which has been demonstrated at one-tenth of a cent per mile.

Work upon the order will be begun at once at the Churchill plant of the Curtiss Aeroplane and Motor Corporation, which has been placed upon a production basis, and it is expected that a working schedule of one plane a day will be in operation in the near future.

The Oriole, announced by the Curtiss company during the month of May, proved a sensation. Before the second machine was completed, the sales department in New York had received orders for more than 100 from customers all over the United States.

The Curtiss Corporation now has distributors organized in all sections of the United States, and on August 9 C. W. Webster, supervisor of South American sales, will leave with a mission to tour the South American countries for the purpose of demonstrating American-made planes and, at the same time, to stimulate and promote aviation in general. He will take with him several of the best known pilots in the country and also the latest models, including the Oriole, Sea Gull, Hornet, the fastest two-place fighting plane, together with the OX-5 motors and the new Curtiss 150 and 400 horse power motors.

Bossert Cleveland Office

The Bossert Corporation of Utica, N. Y., sheet metal stamping specialists, has opened an office in Cleveland at 611 Citizens Building. W. W. Visy, Western sales manager, is in charge.

Huge Dirigible Proposed

At a conference of engineers and shipbuilders at Newcastle, England, Sir Charles Parsons predicted that an airship would be built soon of 8,000,000 cubic feet capacity, four times the size of the R-34, and capable of making a 15,000-mile non-stop journey. He added that a large flying boat was to undertake such a voyage from England to the Cape of Good Hope, crossing Africa from north to south and utilizing rivers and lakes as landing places if need be.



Bruce Eytinge and Chin Y. Chong, a Chinese whom he taught flying at Central Park, L. I.

American Importers Order British Linen

American importers of Irish linen have received information from London that the 30,000,000 yards of aeroplane linen, which was recently sold to an English trader for £4,000,000 was made up of widths running from 25 to 72 inches. The goods which comprised the complete surplus stock held by the British government, were disposed of on the basis of 2 shillings, 8 pence a yard. Belfast mill owners offered to buy the stock at 3½ pence a yard. The quantity sold is about three-fifths of the yearly output of the Belfast looms under normal conditions.

Long Island School Acquires New Field

Business at the Long Island Aviation Co. field at Central Park, L. I., has increased to such an extent that another field has been opened at Massapequa nearby, so that the passenger carrying work would not interfere with the regular course of instruction.

The location at Central Park is ideal for a flying school site, inasmuch as it is within an hour's ride of New York City, surrounded by miles of the most excellent terrain in the East. The field itself is one and a half miles long by a half mile wide, and perfectly level.

The aeroplanes used at the Long Island Aviation School are the Canadian training planes, JN-4 Type, equipped with dual controls, so that the novice is safe in the assurance that the skilled pilot can take control of the plane at all times. The Miessner aerophone facilitates the work of instruction. Students are given additional training in the working and construction of aeroplanes.

INTERNATIONAL AIRCRAFT STANDARDS COMMISSION ORIGIN

DURING the war, owing to the necessity for rapid production of aircraft and the common shortage of material, it was considered advisable to nominate an Inter-Allied Commission to study the question of the standardization of aircraft materials and components internationally. This Commission was authorized by the Allied governments and is composed of national committees appointed in the chief Allied aircraft manufacturing countries, namely, Great Britain, France, United States, Italy and Canada. Its organization is regulated by a set of statutes which have been agreed to by those co-operating in the work. The first meeting was held in London in March, 1918, and was opened and addressed by Mr. Winston Churchill, then Minister of Munitions; Lord Weir (then Sir William Weir, Director General of Aircraft Production, later Air Minister) and others being present.

Aims and Objects

A second meeting of the International Commission, on this occasion presided over by Sir Arthur Duckham, K. C. B., Director General of Aircraft Production, was held in October, 1918, when it was decided that when the war ceased the work of the Commission should not be allowed to terminate, but should be continued on a peace basis, with the following aims and objects:

(a) To study and recommend the industrial and technical standards best suited to the effective and rapid construction of aircraft, with the maximum standardization of material, specifications and interchangeability of component parts and the minimum of maintenance cost.

(b) To keep abreast of all inventions and progress by constant and periodic revision of the standards recommended.

(c) To secure approval and government acceptance of the "International Aircraft Standards" issued by the Commission.

National Committees

The Commission at present consists of six national committees representing the following countries:

Canada	Italy
France	Japan
Great Britain	United States

At the October meeting mentioned above the statutes were revised so as to permit the eventual co-operation of other countries in the work of the Commission with the advent of peace.

Any country, therefore, which does not already participate in the work of the Commission and desires to do so has the right to make application for membership to the Central Office for consideration at the next plenary meeting, but can only take part in the work subject to the approval (four-fifths of the votes received) of the Commission in plenary meeting.

The report of the October meeting, 1918, (A. C. N. 61) gives in detail the various subjects which were considered at that time as being susceptible to early international agreement. Eleven inter-

(*Continued on page* 906)

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative



PILOTS

Dana C. DeHart
Edward V. Gardner
Eber H. Lee
John M. Miller
Leon D. Smith
Max Miller
Charles E. Bradley
Lester F. Bishop
Harold T. Lewis
Leslie E. Stancill
Charles Hugh Anglin
John H. Skoning
Earl F. White
Charles W. Lamborn
Frank H. Crozier
Walter H. Stevens

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

New York-Cleveland Mail 3½ Hours

The aero mail was run on July 8 from New York to Cleveland in 3 hours and 38 minutes, running time. The average speed was 119 miles an hour for the entire distance of 430 miles, the flight being with a De Haviland plane of 400 h.p. The first 215 miles from New York to Bellefonte, Pa., was made in 1 hour and 28 minutes, and the second leg, from Bellefonte to Cleveland, 215 miles, in 1 hour and 50 minutes.

The Aero Mail Service employed two extra planes on July 4th, making ten planes in the flight on that day. At the request of citizens of Chicago and Toledo stops were made and mail taken on at Toledo. The shortest of the ten aero mail trips, made on the 4th, was 215 miles, and the longest 325 miles. Every plane arrived and departed on time, with no forced landings, making a perfect score.

Excellent Aero Mail Record for June

A record of 99 per cent was made by the Aero Mail Service between Washington and New York for the month of June, covering a mileage of 11,118 and carrying 15,643 pounds of mail.

On the Cleveland-Chicago division a perfect score of 100 per cent was obtained. A total of 19,825 miles was run during the month of June on that division and a total of 19,603 pounds of mail was carried. The average speed on that route for the month was 97.8 miles per hour. The best flying was performed on June 18, when the round trip from Cleveland to Chicago and return was made in 6 hours and 14 minutes—an average of 104.4 miles an hour in each direction.

The operation of the Cleveland-Chicago route is without a parallel in the history of aviation. The route was started May 15 and has never missed a day—70 consecutive, daily, non-stop flights of 325 miles each were made without a forced landing. On the 71st trip a gas line connection sprung aleak, causing a forced landing on the emergency aero mail landing field at Bryan, Ohio. On all this flying the Liberty engine itself has never failed a pilot in the air.

The route from New York to Cleveland across the Alleghany Mountains has been operating with the same degree of perfection as the Cleveland-Chicago route since July 1.

On July 4 there were on the mail route between Washington and New York, New York and Cleveland and Cleveland and Chicago ten planes in flight. The shortest route was 215 miles from New York to Bellefonte, Pa., and the longest route was from Cleveland to Chicago, or 325 miles. All ten planes scored 100 per cent, arriving and leaving every station on time.

Three Radio Stations to Guide Aircraft Along Mail Lines

The Post Office Department has contracted for the erection of three high-power radio stations, the first of a chain of wireless communicating centres in various cities to be used primarily for the direction of mail-carrying aeroplanes handicapped by fog, it was announced by Emil J. Simon, manufacturer of radio apparatus for the War and Navy Departments.

Stations will be established at Bellefonte, Pa., and Cleveland, Ohio, with a third at some point on Long Island or at Newark, N. J. Appropriations for them already are available. Others will be erected at Washington and Chicago as soon as Congress provides funds.

Each station will be equipped with steel towers 200 feet high and 300 feet apart and will have a range of approximately 400 miles to mail aeroplanes and approximately 700 miles between stations, the difference in range being due to the lesser sending ability of aeroplane wireless equipment.

Establishment of the radio stations will enable the Post Office Department to maintain communication between cities having air post delivery independent of telegraph and telephone services in the event of a disruption of service by storms or other causes.

UNITED STATES POST OFFICE DEPARTMENT

AIR MAIL SERVICE—WESTERN DIVISION

Monthly Report of Operation and Maintenance

MAY 15 TO 31, 1919

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND UNIT COST					
													Gallon of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
														hr. min.				
61	$30.69	$4.91	$24.03	$20.58	$15.02	$15.85	$7.11	$110.34	$143.02	$25.00	$35.87	$432.42	93	1 05	.....	.....	$399.15	.....
62	101.87	8.75	33.87	20.58	15.02	30.85	63.31	72.75	179.80	25.00	35.87	587.67	277	9 39	748	2.70	60.89	$0.78
63	78.91	9.65	55.30	20.58	15.02	121.93	39.82	84.09	332.66	25.00	35.87	818.83	241	5 42	324	1.34	143.65	2.52
65	211.70	20.55	45.46	20.58	15.02	106.93	144.77	94.99	6.55	25.00	35.87	727.42	680	22 15	1598	2.35	32.69	.45
66	47.26	6.47	45.46	20.58	15.02	106.93	43.08	33.62	.....	25.00	35.87	379.29	162	6 34	641	3.95	57.75	.59
67	15.90	3.52	45.46	20.58	15.02	106.93	12.03	21.54	.....	25.00	35.87	301.85	55	1 50	175	3.18	164.64	1.72
69	25.75	4.91	33.87	20.58	15.02	30.85	33.35	53.30	10.14	25.00	35.87	288.64	77	5 05	426	5.53	56.77	.67
70	142.59	20.25	45.46	20.58	15.02	106.93	117.53	70.82	99.24	25.00	35.87	699.29	473	17 55	1632	3.45	39.03	.42
72	14.00	.....	24.03	20.59	15.03	15.85	14.76	27.75	1.50	25.00	35.87	194.38	40	2 15	225	5.62	86.38	.86
73	71.44	6.56	33.87	20.59	15.03	30.85	67.79	187.58	388.88	25.00	35.87	883.46	212	10 20	873	4.11	85.49	1.01
74	132.75	14.43	45.46	20.59	15.03	106.93	143.23	68.95	234.45	25.00	35.87	842.69	450	21 50	1632	3.63	38.60	.51
76	217.72	21.50	45.46	20.59	15.03	106.93	180.17	69.75	169.42	25.00	35.87	907.44	694	27 28	2213	3.19	33.04	.41
14872	19.80	.....	24.03	20.59	15.03	10.41	.....	.....	.35	36.25	35.87	162.33	60	.....	.....	.....	.....	.....
39366	56.34	7.93	33.87	20.59	15.03	30.85	24.72	26.76	.22	36.25	35.88	288.44	166	3 46	166	1.00	76.57	1.73
Total....	$1,166.72	$129.43	$535.63	$288.18	$210.34	$929.02	$891.67	$922.24	$1,566.23	$372.50	$502.19	$7,514.15	3680	135 44	10653	2.89	$55.36	$0.71

Cost per mile, overhead, $.17; cost per mile, flying, $.21; cost per mile, maintenance, $.33.

OTTO PRAEGER, Second Assistant Postmaster General.

THE ANSALDO 1 BIPLANE

THE Italian "Ansaldo 1" Single Seater was built as a result of the comments of pilots at the front, who convinced the constructors of the S. V. A. aeroplane that the latter machine was essentially a long distance plane adapted to endurance and speed, but not possessing the extreme rapidity of climb and manouevring flexibility required of a pursuit plane, which must at all times be ready to climb quickly to all altitudes to engage in defensive combat.

The good results obtained by the combination of the S. P. A. engine and the S. V. A. aeroplane led the builder to devise a new type, in which the good qualities of the S. V. A. could be retained but the size and weight reduced and the carrying capacity limited to 2½ hours' fuel with a resulting increase in the characteristics desired. After a number of experiments in this direction, the "Ansaldo 1" (better known by its nickname of "Balilla," the popular Italian hero) was produced. In this machine the wing spread is reduced, and upper and lower planes are similar in size. The moment of inertia is reduced because the engine and pilot have been brought nearer the center of gravity and the tail shortened. The small wing spread makes it possible to employ but two struts on each side, braced by diagonal cables.

General specifications of the "Ansaldo 1" Single Seater and the S. P. A. engine are as follows:

General Specifications

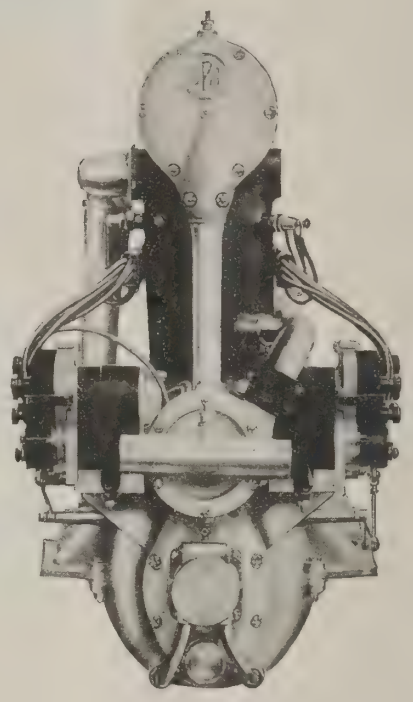
Span, upper plane	25'-0"
Span, lower plane	21'-8"
Chord, both planes	5'-0"
Gap, between planes	4'-8"
Overall length	21'-8"
Overall height	10'-6"
Engine, S. P. A. Ansaldo	220 H.P.
Speed	145 M.P.H.
Climb in 16 minutes	16,000 Ft.
Climb in 25 minutes	20,000 Ft.
Useful load	550 pounds
Normal flight endurance	3 hours

Engine

Power at 1,500 r.p.m.	190 H.P.
Power at 1,600 r.p.m.	210 H.P.
Power at 1,700 r.p.m.	225 H.P.
Number of cylinders	6 vertical
Bore	135 mm. (5-5/16")
Stroke	170 mm. (6-11/16")
Weight, including water	550 pounds
Fuel consumption per hr., at 1,700 r.p.m.	17.5 gals.
Fuel consumption per hr., at 1,500 r.p.m.	16. gals.
Oil consumption per hour	6 pounds

Main planes are equal in span. Upper planes in single section and lower plane in two sections, one at each side of the body. Above the fuselage an auxiliary fuel tank is built into the upper wing.

Ailerons are operated by a rigid system of control, with steel tubes running through the wing to vertical rods connected to the control column.



End view of the 6 cylinder 200 H.P. S.P.A. engine

Fuselage is covered with thin mahogany veneer. The forward part in the vicinity of the engine is covered with sheet aluminum. The shape of the fuselage is unusual. At the wings, body is of the usual rectangular section, but aft of the pilot's seat, the two lower longerons merge with one another and run straight back to the rudder. This gives the rear part of the fuselage a triangular section with, of course, the rounded turtle deck on top. This shape has proven to give very satisfactory results from an aerodynamic point of view, while constructionally the triangular trussing has many structural points of advantage.

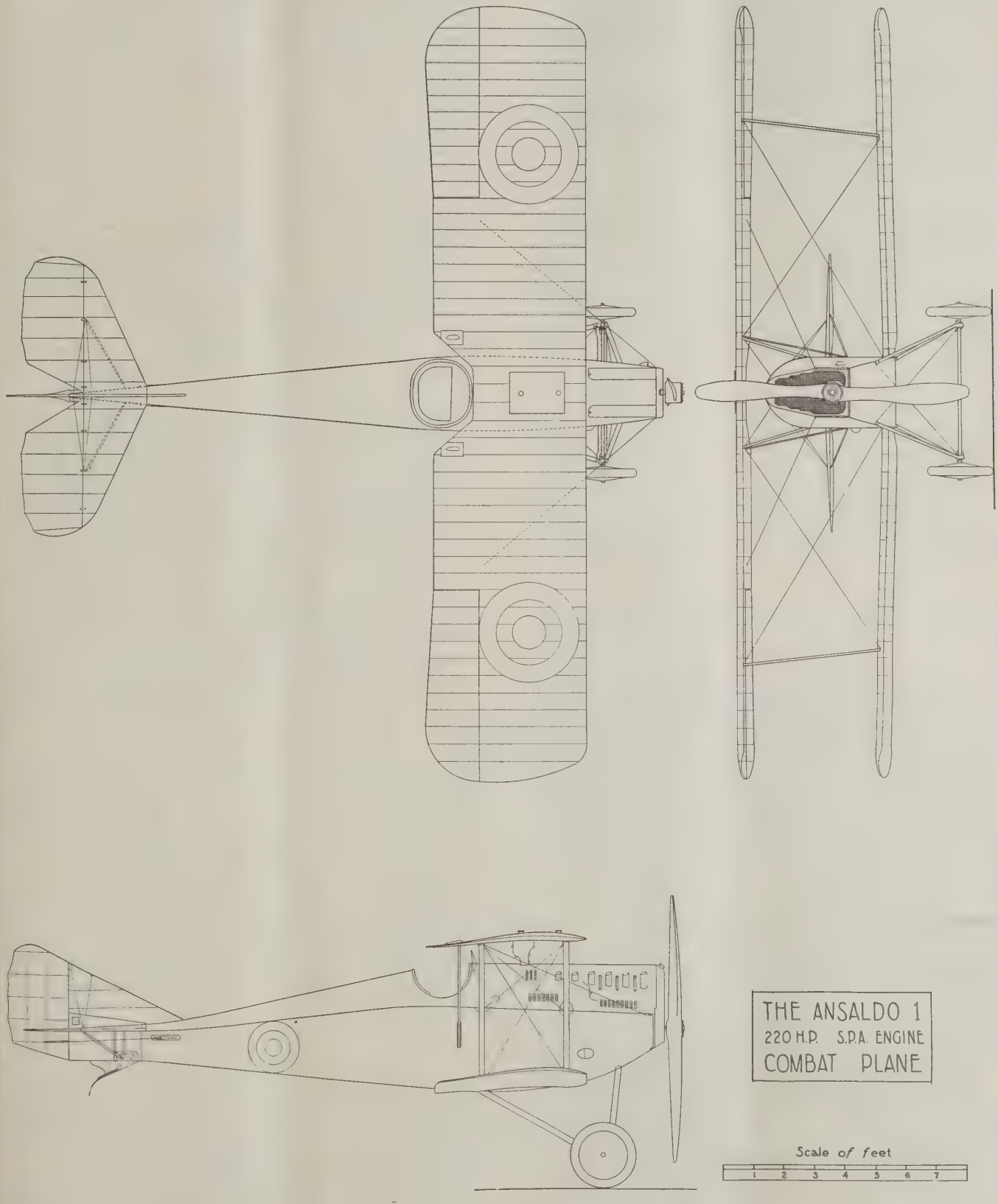
The elevators are operated by a short pressed steel lever enclosed in the fuselage, doing away with exposed operating cables. A small inspection door is located in the fin to permit examination and adjustment of the lever. Rudder is operated by a pair of hardwood levers located below the elevators. The elevator is supported from below by a pair of steel rods from the fuselage and two pairs of solid steel wires from the fin.

The tail skid is a three-leaf steel spring, attached to the underside of the fuselage by flat steel plates and faired by hardwood blocking.

To eliminate fire risk, the main fuel tank located just forward of the pilot can, in an emergency, be instantly released from the machine by pulling a cable located within the pilot's easy reach.



Three-quarter front view of the Italian "Ansaldo 1" combat aeroplane. With a 200 H.P. S.P.A. engine the "Ansaldo 1" makes a speed of 145 miles an hour


THE ANSALDO 1
220 H.P. S.P.A. ENGINE
COMBAT PLANE
Scale of feet
1 2 3 4 5 6 7
McLaughlin

THE VALUE OF SUPERCHARGING

A TEST has been carried out at the Altitude Laboratory of the Bureau of Standards to discover the results of increasing the carburetor air inlet pressure above the exhaust back pressure of an aeroplane engine, and to evaluate the effect of this upon the horsepower output.

The results of this test show what gain in horsepower may reasonably be expected through supercharging, and indicate that a net gain in horsepower will result even if considerable power is needed to drive the blower.

The engine under test is enclosed in a chamber the air pressure in which may be controlled independently of that on the carburetor inlet, by means of suitable pipes and valves leading to the atmosphere and to a suction blower.

A stock 150-horsepower Hispano-Suiza engine, built by the Wright-Martin Aircraft Corporation, New Brunswick, N. J., having a compression ratio of 5.3 to 1, was used in making the tests. The Claudel carburetor with which the engine was equipped was adjusted in each case to give maximum power.

Two runs were made with approximately a constant pressure on the carburetor, and with varying exhaust back pressures in each case. The first run was made with the valve on the intake wide open, so that the highest pressure could be obtained on the carburetor. The pressure within the chamber, which is the same as the exhaust back pressure, was adjusted and readings taken at values of approximately 62, 50, 38 and 34 cm. Hg. The data obtained are listed in Fig. 1, and the results are plotted as Curve "A" in Fig. 2.

Figure I—Table of Data on Test 108

Barometric Pressure. Cms. of Hg.	61.9	49.7	37.5	33.9	33.1	37.7	50.0	62.1
Pressure at Carburetor Intake. Cms. of Hg.	72.67	71.42	71.12	70.22	55.22	55.22	55.22	55.22
Horse Power Corrected to O°C and 1500 RPM	170.2	171.3	173.4	171.8	132.9	129.6	125.4	122.0
Lbs. of Gasoline per Horse Power per Hour	.584	.593	.573	.580	.567	.545	.554	.559

In the second run, the valve on the intake was partially closed, so that the pressure on the carburetor was the equivalent of 20 cm. Hg below the prevailing atmospheric pressure, and readings taken at approximately the same points as before. The results of this run are given in the second half of Table 1 and are plotted as Curve "B" in Fig. 2.

In the first run the pressure of the intake air was not constant throughout, varying from 72.67 to 70.22 cm. Hg, so that it was necessary to correct the results to some constant pressure. The correction was made to a pressure of 70 cm. Hg by interpolation, which is based on the assumption that the increment of horsepower developed at a given back pressure is proportional to the increment of pressure of the carburetor air. This correction gave Curve "C" in Fig. 2. All horsepowers were corrected to 1500 r.p.m. and O° C. This temperature correction was made in accordance with the results of a series of tests performed in this laboratory to determine the variation of horsepower with temperature.

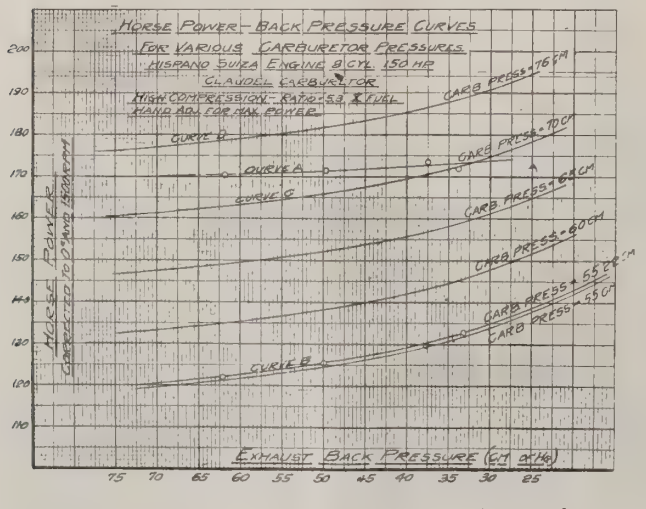


Figure 2—H.P. back pressure curves for various carburetor pressures

In order to determine the engine performance under different conditions of carburetor pressure and exhaust back pressure, a family of curves at carburetor pressures of 76, 70, 65, 60 and 55 cm. Hg were plotted against the exhaust back pressures. These were derived from the two experimental curves by interpolation based on the assumption as mentioned above.

As it is desirable for purposes of design to know the engine output under different conditions as a function of the maximum output on the ground, the ratio of horsepower taken from the above-mentioned curves to the horsepower at a carburetor and exhaust pressure of 76 cm. Hg, taken from Curve "D," is computed and plotted in Fig. 3. These curves give the engine performance under the different conditions on the basis of a constant temperature of air at the carburetor.

To compute the horsepower that would be developed by an engine equipped with a supercharging device, under a given set of conditions of altitude, carburetor air pressure and exhaust back pressure, knowing the engine performance on the ground, we may make use of the above-mentioned curves in connection with the following relations:

$$HP = HP_1 \times R \times (F_2)_1 \qquad (1)$$

in which HP = horsepower developed with the supercharging apparatus at the given altitude, and HP_1 = the observed horsepower on the ground at the observed carburetor air temperature of t_1, and R = horsepower ratio at the given conditions of exhaust and carburetor pressures produced by the supercharging device at the given altitude (obtained from curves in Fig. 3), and $(F_2)_1$ = temperature correction factor to correct from observed temperature on the ground; t_1, to temperature at the carburetor; t_2, under the given conditions.

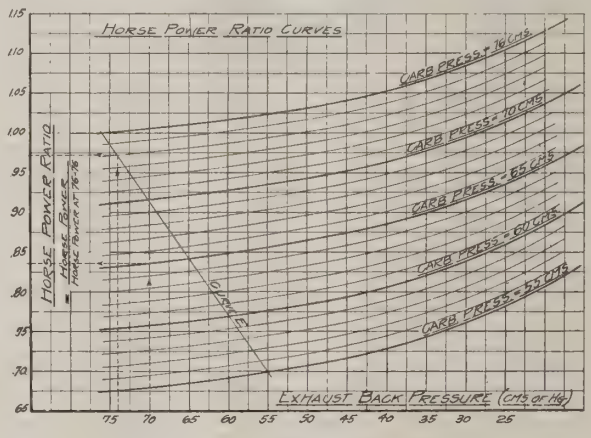


Figure 3—Horsepower radio curves

The use of any form of supercharging device involves a compression of the air from the prevailing atmospheric pressure at the given altitude, to some higher pressure, before entering the carburetor. This results in a heating of the air above the prevailing temperature of the atmosphere, and a consequent reduction of the available output of the engine. (For average temperatures of atmosphere at various altitudes see Curve "B" on Sheet 6.) The temperature resulting from such a compression may be computed by the use of the equation:

$$T_2 = T_1 \left(\frac{P_2}{P_1}\right)^{\frac{n-1}{n}} \qquad (2)$$

in which T_2 = temperature at carburetor after compression (absolute) and T_1 = temperature of the atmosphere before compression (absolute); and P_2 = pressure at the carburetor after compression; P_1 = atmospheric pressure at the given altitude (pressure before compression), and n = the compression exponent (1.41 for an adiabatic compression).

As the air entering the carburetor at the temperature t_2, after compression (corresponding to the absolute temperature T_2 of Equation 2) is in most cases different from the observed temperature on the ground, t_1, the temperature correction factor $(F_2)_1$ must be included in Equation 1 to give the correct output that would be developed at the existing air temperature at the carburetor under the given conditions.

To facilitate computations, charts were constructed in Figs.

4 and 5 for obtaining the temperatures after compression, t_2, according to Equation 2, and the temperature correction factor $(F_2)_1$ respectively.

In using the chart for compression temperatures it is unnecessary to determine the temperature of the altitude, as this is a function of the altitude barometric pressure, and is incorporated into the chart. To use this chart, locate carburetor pressure on the horizontal scale at the bottom, trace vertically upward to the line of barometric pressure corresponding to the given altitude, then horizontally to the curve of the desired compression exponent. From there trace vertically upward or downward to the line corresponding to the barometric pressure of the altitude, and horizontally to the right to the scale of temperatures. This gives the temperature after compression in degrees C.

The temperature correction factor $(F_2)_1$ may be obtained from the chart in Fig. 5. To use this chart, locate the observed temperature on the ground, t_1, on the horizontal scale at the bottom, and trace vertically upward to the line corresponding to the compression temperature as obtained from chart in

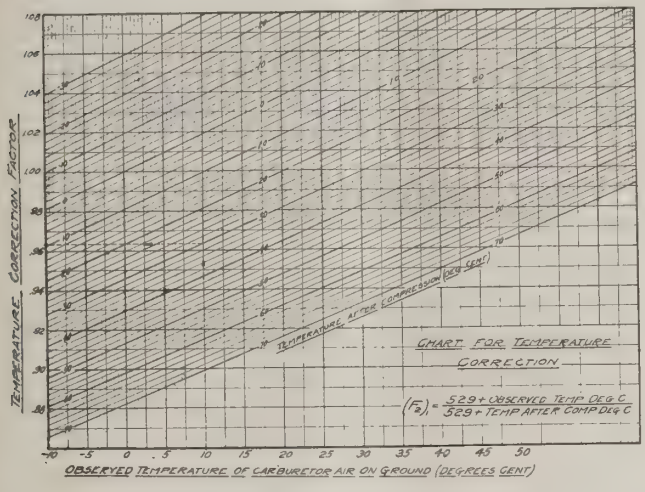


Figure 5—Chart for temperature correction

Fig. 4. From there trace horizontally to the line of correction factors.

An example may serve to illustrate the use of the curves and charts. Assume that an engine capable of developing 400 horsepower on the ground at a temperature of 10° C. (50° F.) is to be equipped with an exhaust pressure turbine blower, which at a barometric pressure of 35 cm. Hg (corresponding to 21,100 feet altitude and a temperature of — 21° C.) (see curves "A" and "B" in Fig. 6) exerts a back pressure on the engine of 35 cm. Hg and increases the carburetor pressure by 30 cm. Hg. Then we have for the exhaust pressure on the engine at a given altitude 35 + 35 = 70 cm. Hg and for the carburetor pressure we have 35 + 30 = 65 cm. Hg. From the curves in Fig. 3 we obtain a horsepower ratio of 0.836. To obtain the temperature after compression we may assume an adiabatic compression with an exponent of 1.41, and from the chart in Fig. 4 obtain a temperature after compression of 30° C. From the chart in Fig. 5 we obtain the temperature correction factor to correct from 10° C. to 30° C. = 0.963. Substituting these values in Equation 1 we obtain for the horsepower at 21,100 feet, with exhaust pressure turbine blower supercharging equipment:

$400 \times 0.836 \times 0.963 = 322$ HP.

If a geared blower were used, then in obtaining the horsepower ratio the barometric pressure at the given altitude

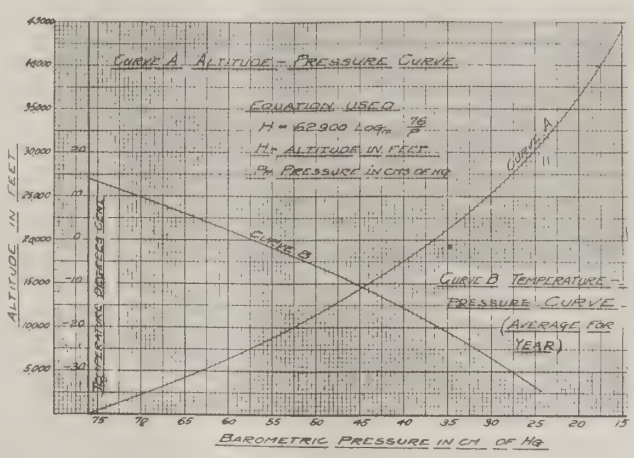


Figure 6—Altitude and temperature pressure curves

would be used as the back pressure on the engine; and from the available output computed on this basis the power necessary to drive the blower would be deducted.

If it is desired to include, as a further refinement in the above computations, a correction to the observed horsepower on the ground, HP, for barometric pressure, the output as computed by Equation 1 may be multiplied by a pressure correction factor obtained from Curve "E" in Fig. 3, as follows:

Locate the intersection of Curve "E" with the curve of carburetor pressure corresponding to the observed barometric pressure on the ground, trace horizontally to the left and read horsepower ratio. The barometric pressure correction factor is 1 divided by this horsepower ratio.

An illustration will serve to make clear the use of this correction factor. Assume that in the above example the observed horsepower (400) was obtained at an observed barometric pressure of 74 cm. Hg. From Curve "E" we obtain, by the method described above, a pressure correction factor of

$\frac{1}{.972}$ (see Fig. 3) = 1.03. Applying this to the horsepower obtained, we get

$322 \times 1.03 = 332$ HP.

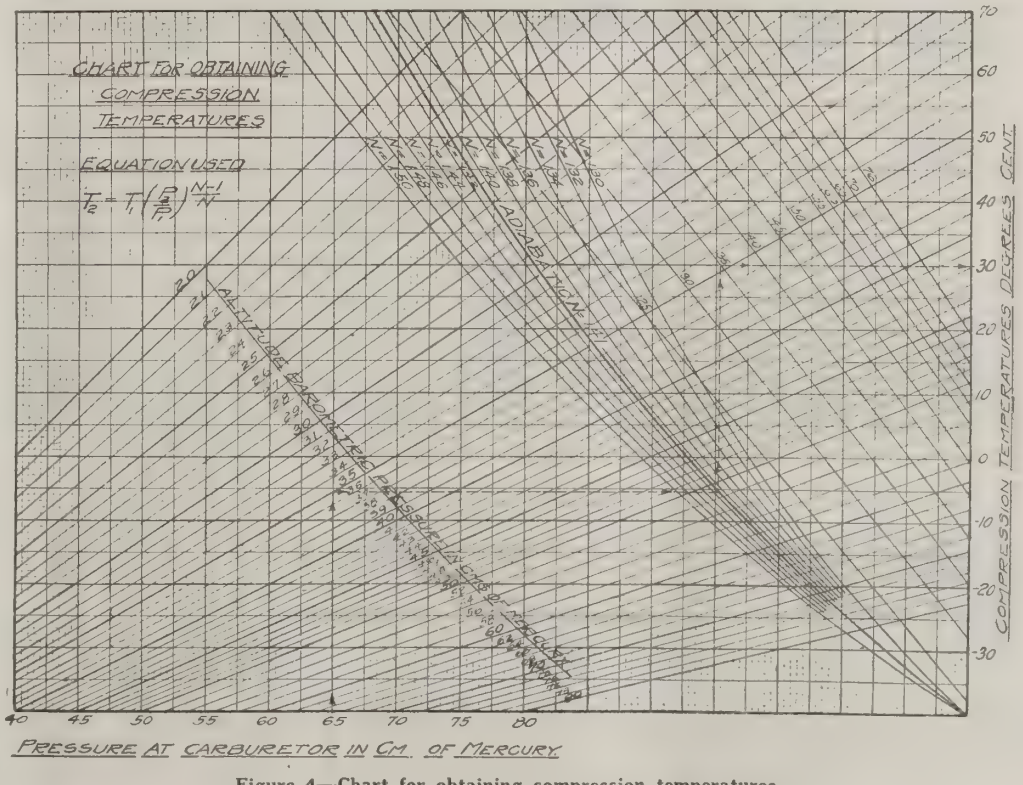


Figure 4—Chart for obtaining compression temperatures

A PORTABLE HANGAR FOR AEROPLANES

SINCE aviation became a scientific demonstration instead of a theory, it has been the endeavor of aviators and engineers to construct a portable aeroplane hangar that would combine ample working space without waste of material, strength of wind resistance sufficient to withstand storms even when they approach cyclonic velocity, and ease of egress and ingress.

During the war the Aviation Section of the War Department made numerous experiments along this line with indifferent success. Severe tests of a newly designed portable hangar of this kind were made last week at the U. S. Flying Station at Hazlehurst Field, Mineola, L. I., under the supervision of Major J. E. Rossell, Engineering Officer of the Army Air Force stationed there. The hangar, manufactured by Foster & Stewart Co., was erected in a gale of wind and stood up against a heavy rain storm that came up during the night.

These wind-proof hangars are easily transported from field to field, and can quickly be erected by the crew of the machine it is built to protect. They are standardized for the various makes of planes, and are particularly suitable for the JN-4 type Curtiss.

The width of the hangar is 51 feet, which allows 3½ feet on each side to the tips of the plane. The walls of the main body of the tent are 12 feet, allowing ample clearance space for the ingress and egress of the plane, yet making the highest point of wind resistance only 13 feet. At this point the hangar is protected by a double set of guys which are built into the tent, and which criss-cross themselves in a manner to balance the strain, no matter from what direction the wind may blow. There is nothing to unfasten or to become unfastened, as these guys, passing as part of the top completely over the hangar, are fast to the rings the poles go in. The extension to accommodate the fuselage is of ample size to allow working room, and is designed at an odd slant to shed wind and water. It is guyed just as substantially as is the main body of the hangar.

The detail of the construction is simple. Likewise the method of erection. All that is necessary is to spread out the tent, and put it up. The JN-4 hangar can be erected by two men in a short time.

When the tent is up, the front wall is tight, but is attached to a cable at the top, and can be opened from the center, portiére style, for the ingress and egress of the plane. When close, these center pieces are lashed together, making it to all intents and purposes a continuous piece of canvass. Iron pegs at the bottom secure the front to the ground.

The width of the hangar is such that there is ample room for cots or camp beds under the tips of the upper planes, and the walls are so made that they can be rolled up six feet and then firmly lashed, giving air from all directions.

This hangar first was erected the Sunday previous to the Government inspection on the flying field of the Hotel Nassau, at Long Beach, L. I., where former Lieuts. Lyman B. Lockwood and Edward K. Merritt have established a passenger carrying business.

The specifications of the JN-4 Curtiss hangar, are as follows:

The total width of hangar is 51 ft., and depth 39 ft. The dimensions of plane space are: 51 ft. width by 17 ft. 2 in. in depth, and the height to the center, 20 ft. Walls and front are 12 ft. in height.

The dimensions of the extension to accommodate the fuselage are 16 ft. 6 in. deep, the wall at the right being 12 ft. in height, and on the left 7 ft. in height. The wall of the tent on front, sides and ends is constructed to roll to height of 6 ft. and to lash to allow a free circulation of air.

The top is made of 12-oz. khaki, all hand roped with 9/16-in. and ½-in. diameter manila rope. All walls and ends are of 8-oz. double filled khaki with wind bands for strength throughout; all hand-roped at ends and bottom. The bottom of the ends and walls are equipped to snap to iron pins 12 inches long with an eye, and the front wall to snap to cable 3/16 in. diameter with two turnbuckles. The front wall is to slide from center to ends, and the front is lashed to ½-inch diameter cable with two turnbuckles and ropes to pass through thimbles to prevent chafe.

All guys of manila rope 9/16 in. in diameter are fastened to tent, and are non-detachable. All lanyards are of ¼-in. manila rope, and all 12 and 7-ft. pole lanyards are of 5/16 in. manila rope. All lacing holes are No. 4 sheet brass grommets, and all holes to receive poles on lower edge of tent are round galvanized thimbles, preventing chafe to any rope. All other pole holes in upper part of roof are of drop forge rings, hand-worked in and leathered to protect ropes leading through the bottom of tent to rings.

Poles: two, each 20 ft. long by 4½ in. in diameter; two, each 15 ft. long by 3½ in. in diameter; ten, each 12 ft. long by 3½ in. in diameter; two cable poles, 12 ft. by 5 in. in diameter with sheaves which cross pole 16 ft. 9 in. by 3½ in. diameter to lash fusalage end to.

Total stakes: thirty-eight, hickory wood, each 40 in. long, banded and painted.

Iron pins for bottom of wall and ends: forty.

Weight: Tent and wall, 530 lbs; stakes, 191 lbs.; cables, 122 lbs.; poles, 882 lbs.; total weight, 1,725 lbs.



A compact canvas hangar for a Curtiss JN aeroplane, erected at Hazelhurst Field, Mineola, for the purpose of testing it under severe weather conditions

THE GENERAL PROPERTIES AND USES OF PLYWOOD

By B. C. BOULTON, B.S., A.E.

PART III

(*Continued from page* 815)

THE ordinary thickness for the veneer in either the three- or five-ply construction is 1/32 in. for each ply. In general fuselage work the thickness of the core is usually about 50 per cent that of the plywood.

Beside the type of veneer fuselage which has just been described, another kind is being further developed, properly known as the monocoque type. A body of this character can be made almost perfect aerodynamically, owing to the fact that it can be built to conform to practically any contour desired. Structurally, a monocoque body acts like a shell. It is characterized by its rigidity and resistance to distortion. Though light longerons are used, they do not play a very important part in carrying stress. In the same way, the bulkheads in the rear portion of the body are reduced in number to about three, and serve solely to stiffen the structure. It is possible to build such a fuselage for a weight considerably less than that of any other type. Unfortunately, owing to the large amount of labor required in its construction, this type as yet is expensive. Methods may be evolved that will simplify the present process.

The general method of construction is as follows: First, a heavy wood form is built up which is the exact shape of the body. This is made in two symmetrical halves. When the form is ready, the work of putting on the veneer is begun. There are two general methods for building up the body. The customary process is illustrated by the well known L.W.F. fuselage and is quite reasonable in cost. With this type, thin veneer strips 4 to 6 in. in width are wound spirally about the form so as to make about one turn in the length of the body. After this first layer of veneer is complete, cloth tape some 2¼ in. wide is wound over the veneer in a continuous strip, lapped about ¼ in., and glue applied. Another layer of veneer is now laid, wrapped around the body in a spiral of the same degree, but opposite in direction to the first. On top of this comes a second layer of tape wound as before. The third and last layer of veneer is now applied with the grain longitudinal. After the structure has dried three or four days, the mold, which with this method of construction is not in two halves but is collapsible, is removed. One layer of Utica sheeting, applied to the outside of the body with dope, forms the finish. Spruce veneer has been found very satisfactory. A usual thickness is 1/32 to 1/16 in. In general, transverse sections of such a fuselage are symmetrical about two axes. It is not practicable with this type to form the veneer into sharp curves, and therefore the fairing of the lower wing into the body, or the construction of the fin integral with the body, is very difficult.

The second general method carries out still further some of the principles involved in the construction just described. It is probable that better results in every way can be obtained in a body built according to this later process. However, on account of the amount of labor entailed, it is a method not adapted to large scale production. Some important details are still being developed. In this process, the veneer in long, narrow strips not more than 2 in. wide is wound on each half form in a tight spiral of such degree that the strip makes an angle of approximately 45° with the longitudinal axis. These strips are crowded close together and are lightly tacked down to hold them in place. On completion of this layer, the second is begun. The strips now run at right angles to those forming the inside layer. As they are laid, Certus joint glue is applied between them and the first layer. Immediately, the strips are butted up close against each other and secured firmly in place by short, light nails every 4 or 5 in., driven through a little 1 in. cleat of plywood. After the glue has thoroughly dried these nails and cleats are pulled off, and the form is ready for the third layer of strips, laid with glue in the same manner as before and at right angles to the strips in the second layer. When this step is completed a fourth layer of strips is applied, again at right angles to the strips in the adjacent layer. On the drying of these last strips and the removal of the nails, each half the shell may be readily removed from the form and carefully trimmed along the joint lines. The two parts of the shell are now ready to be fitted together. The splice, which occurs at the bottom and top, is made by an inside, laminated keelson, 2 x 5/16 in. to which each half the shell is securely screwed and glued. The edges of the shell are butted together, thus forming a regular butt joint with a single cover plate. The last step in the process is the application of a layer of sheeting, which is put on with hot glue, and after drying is doped and varnished. The plies forming the shell are of soft wood like poplar or spruce, each ply being about 1/16 in. in thickness.

Bulkheads: In the forward part of the fuselage the bulkheads that support the engine and gasoline tanks, and receive stresses from the lift wires are of heavy construction. To secure maximum homogeneity a large number of plies, each of 1/16 or 3/32 in. thickness, is used. The total thickness of such bulkheads will ordinarily be between ¾ and 1 in. If great strength is desired, birch or maple veneer is employed, but on lighter work spruce is used successfully. It is common practice when the bulkhead is of spruce or some similar wood, to have all the plies of the same species of wood and of the same thickness, but frequently a combination of a strong, heavy wood and a light wood is advantageous.

Another more recent type of bulkhead which is much lighter

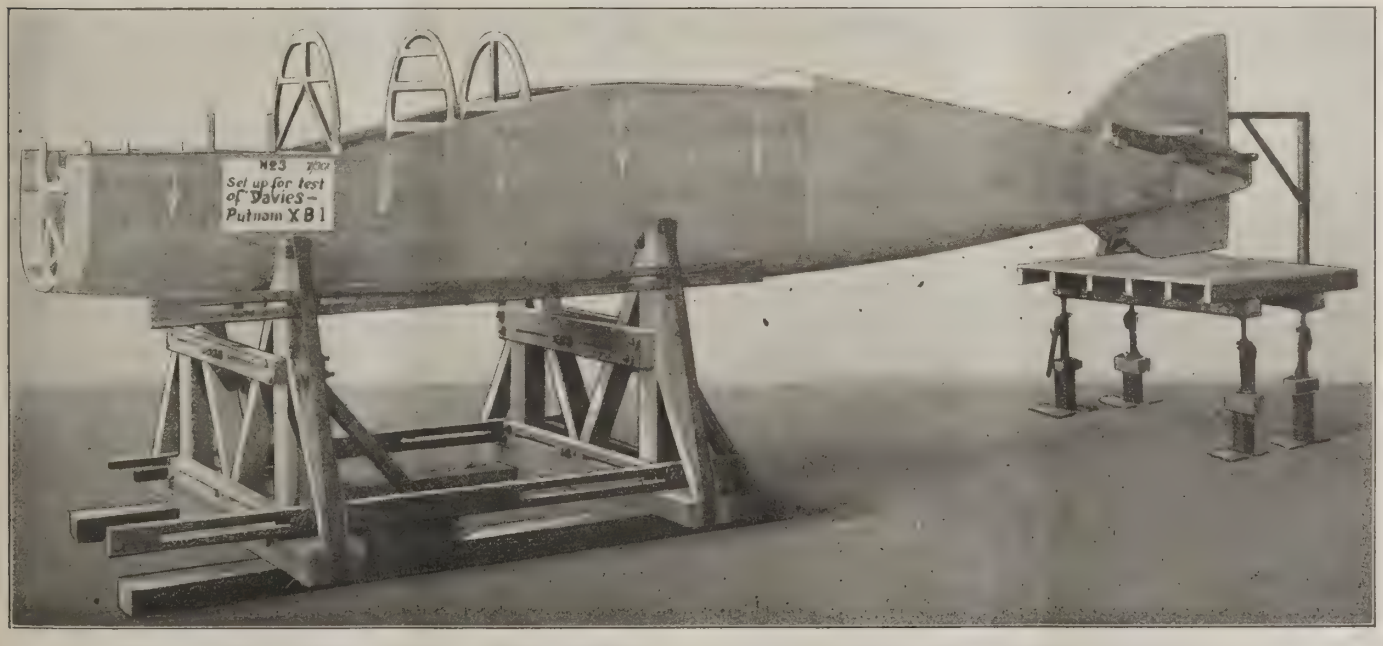


Fig. 9. Veneer Fuselage Complete, showing longitudinal and transverse Splices in Skin. Fuselage ready for Sand Test

than that just described is a form of built-up, truss construction, in which the stresses are carried by solid spruce members. These are connected, and built into one structure by two light sheets of three-ply veneer, which form flanges for the spruce columns, one sheet being glued to each face of the bulkhead. Reference to Fig. 10 will make the construction clear. The gains with this type of bulkhead are due to the smaller amount of glue necessary, and to the fact that, because all the grain of the compression members runs in the direction of the stress, the material is most effectively used.

TABLE 4

COMPARISON OF STRENGTH OF THREE, FIVE, AND SEVEN-PLY YELLOW BIRCH PLYWOOD. ALL PLIES OF SAME THICKNESS IN ANY ONE PANEL

No. of Plies	Av. Sp. Grav.†	Av. % Moist.	No. of Tests	Column-Bending Modulus In lbs. per sq. in.		Tension In lbs. per sq. in.		Av. Splitting Resistance Compared to 3-ply Birch, for the same Plywood Thickness. In % of 3-ply
				Parallel *	Perpend*	Parallel *	Perpend*	
3	.68	6.1	80	19,100	3,700	14,400	7,900	100
5	.67	6.6	25	14,700	6,800	13,100	8,600	143
7	.70	7.1	25	14,300	7,900	12,900	9,300	212

†Specific gravity based on oven dry weight and volume at test.
*Parallel and perpendicular refer to direction of grain of faces relative to direction of application of force.

In veneer fuselage construction, the bulkheads in the rear act principally as stiffening rings in preventing distortion of the skin. As they carry only these secondary stresses it is possible to make them light. Five-ply spruce of ⅜ in. total thickness, or five-ply mahogany and poplar of the same thickness, for instance, is suitable for most work. Fig. 8 illustrates some of the various features that have been discussed.

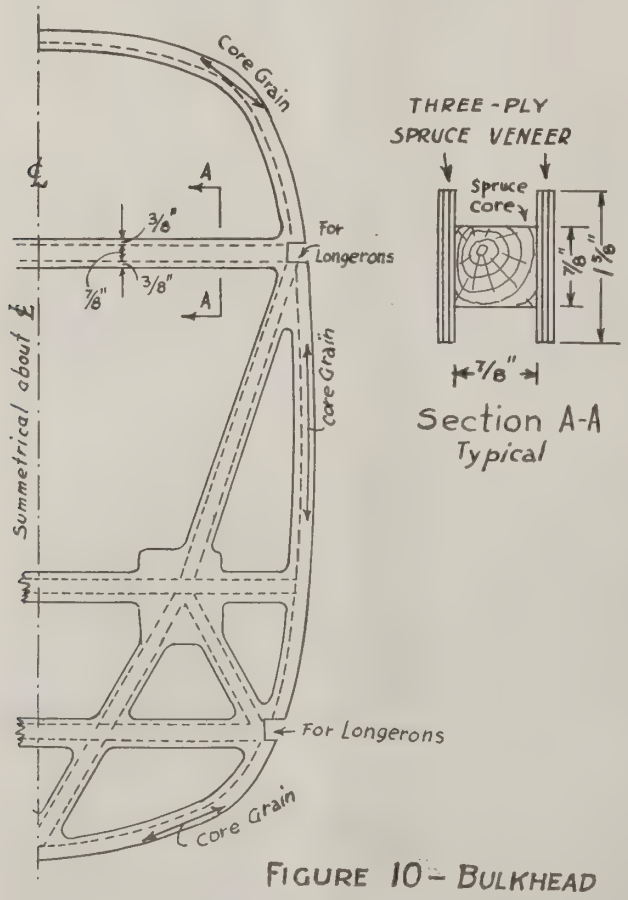


FIGURE 10 – BULKHEAD

Covering for Wings and Control Surfaces: Plywood, when used to replace fabric on aerofoils, has several advantages. One of these is the elimination of sag between ribs, this distortion being considered detrimental to the efficiency of the aerofoil. Another advantage is that with plywood there is but very slight possibility of its tearing loose from the wings, as sometimes occurs with fabric. Again, plywood braces and stiffens the wing structure, distributes the stresses and, if not too thin, adds materially to the structural strength of the wing, making it possible to omit internal drift bracing, and to reduce the size of the spars. On the other hand, the plywood may warp or wrinkle, though proper design and care in the method of application should prevent this trouble. Even the lightest plywood developed up to the present weighs at least 2 to 3 times as much as doped fabric. Probably the best, very thin plywood so far designed is constructed of Spanish cedar, and has a total thickness of 1/32 in. This makes it too thin to add directly to the structural strength of the wing. Its principal use would be on control surfaces, on the center section of the main wings, and on the upper surface of these wings from the leading edge back to the front spar.

Unless some great improvement occurs in the design of plywood for wing covering and in its application, it cannot be used on modern planes on account of its excessive weight.

Spars: Because of the shortage, during the war, of suitable spruce for spars, many experiments have been made to develop a plywood spar. No such section has ever approached the efficiency of the solid spruce spar. This is due to the large increase in weight caused by the glue. The best types of laminated spar produced are the box section, with solid spruce flanges and about 3/16 in. three-ply webs, and the I-section with solid flanges and a web of three, or possibly five, thick laminations. The utilization of material of small section and inferior quality is the advantage sought by the use of plywood in spars. It can, however, be more easily obtained in built-up spars than in laminated ones. Spruce is a material that is most commonly employed for spars, although birch is frequently used for the faces of the webs in box spars. The face plies in this type of spar have their grain horizontal. The total thickness of each web varies from ⅛ to ¼ in., depending on the depth of the spar, while the core thickness is about half this amount.

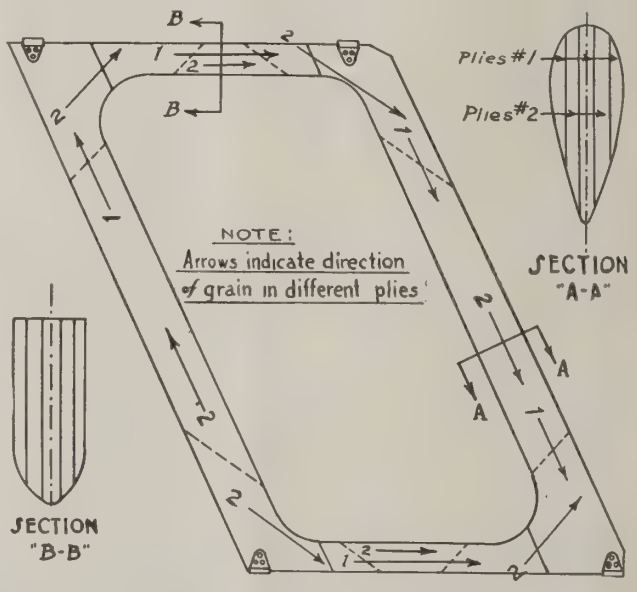


FIGURE 11 - Portal interplane strut

Struts: In order to minimize the effect of spiral or cross-grain in spruce, a laminated construction is sometimes used in struts. Since the grain of all the laminations runs in the

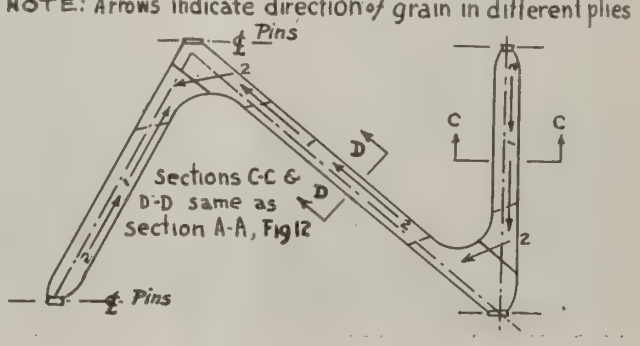


FIGURE 12 - Cabane or center section Strut

TABLE 5
WEIGHTS OF VENEER
In Ounces per Square Foot of One Ply. Veneer Thickness in Inches

Species	Sp. Grav. Oven-Dry based on Volume Air-Dry	Air-Dry Moisture content percent	1/100	1/80	1/64	1/60	1/55	1/48	1/40	1/32	1/28	1/24	1/20	1/16	1/12	1/10	1/8	1/6	3/16	1/4
Ash, Black	.50	10.4	.42	.52	.65	.69	.76	.87	1.04	1.30	1.49	1.74	2.08	2.60	3.47	4.16	5.20	6.94	7.81	10.41
Ash, White	.64	8.7	.53	.67	.83	.89	.97	1.11	1.33	1.67	1.90	2.22	2.66	3.33	4.44	5.32	6.66	8.88	10.00	13.32
Basswood	.38	8.4	.32	.40	.49	.53	.58	.66	.79	.99	1.13	1.32	1.58	1.98	2.64	3.16	3.96	5.28	5.94	7.92
Beech	.63	11.2	.52	.66	.82	.87	.95	1.09	1.31	1.64	1.87	2.19	2.62	3.28	4.37	5.24	6.56	8.74	9.84	13.12
Birch, Yellow	.63	9.6	.52	.66	.82	.87	.95	1.09	1.31	1.64	1.87	2.19	2.62	3.28	4.37	5.24	6.56	8.74	9.84	13.12
Butternut	.39	7.6	.32	.41	.51	.54	.59	.68	.81	1.02	1.16	1.35	1.62	2.03	2.71	3.25	4.06	5.42	6.09	8.12
Cherry	.51	9.2	.42	.53	.66	.71	.77	.88	1.06	1.33	1.52	1.77	2.12	2.65	3.54	4.25	5.31	7.08	7.97	10.62
Cottonwood	.43	4.7	.36	.45	.56	.60	.65	.75	.90	1.12	1.28	1.49	1.79	2.24	2.98	3.58	4.47	5.97	6.71	8.96
Elm, White	.51	8.8	.42	.53	.66	.71	.77	.88	1.06	1.33	1.52	1.77	2.12	2.65	3.54	4.25	5.31	7.08	7.97	10.62
Gum, Black	.52	7.2	.43	.54	.68	.72	.79	.90	1.08	1.35	1.55	1.80	2.17	2.71	3.61	4.33	5.42	7.32	8.12	10.82
Gum, Cotton	.52	6.1	.43	.54	.68	.72	.79	.90	1.08	1.35	1.55	1.80	2.17	2.71	3.61	4.33	5.42	7.32	8.12	10.82
Gum, Red	.49	11.3	.41	.51	.64	.68	.74	.85	1.02	1.28	1.46	1.70	2.04	2.55	3.40	4.08	5.10	6.80	7.66	10.20
Hackberry	.54	9.2	.45	.56	.70	.75	.82	.94	1.12	1.40	1.61	1.87	2.25	2.81	3.75	4.49	5.63	7.50	8.44	11.24
Maple, Silver	.48	8.2	.40	.50	.62	.67	.73	.83	1.00	1.25	1.43	1.67	2.00	2.50	3.33	4.00	5.00	6.66	7.50	10.00
Maple, Sugar	.62	10.5	.52	.65	.81	.86	.94	1.08	1.29	1.61	1.85	2.15	2.58	3.23	4.30	5.16	6.46	8.60	9.69	12.91
Oak, Red	.63	10.9	.52	.66	.82	.87	.95	1.09	1.31	1.64	1.87	2.19	2.62	3.26	4.37	5.24	6.56	8.74	9.84	13.13
Oak, White	.69	11.5	.57	.72	.90	.96	1.05	1.20	1.44	1.80	2.05	2.40	2.87	3.59	4.79	5.74	7.18	9.58	10.78	14.37
Poplar, Yellow	.41	6.1	.34	.43	.53	.57	.62	.71	.85	1.07	1.22	1.42	1.71	2.13	2.84	3.41	4.27	5.69	6.40	8.54
Sycamore	.50	9.2	.42	.52	.65	.69	.76	.87	1.04	1.30	1.49	1.73	2.08	2.60	3.47	4.16	5.20	6.94	7.82	10.41
Walnut, Black	.57	4.8	.47	.59	.74	.79	.86	.99	1.19	1.48	1.70	1.98	2.37	2.97	3.96	4.75	5.94	7.92	8.91	11.87
Cypress	.43	9.0	.36	.45	.56	.60	.65	.75	.90	1.12	1.28	1.49	1.79	2.24	2.98	3.58	4.47	5.97	6.72	8.96
Fir, Douglas	.44	9.4	.37	.46	.57	.61	.67	.76	.92	1.15	1.31	1.53	1.83	2.29	3.05	3.66	4.58	6.10	6.87	9.16
Hemlock	.42	8.6	.35	.44	.55	.58	.64	.73	.87	1.09	1.25	1.46	1.75	2.18	2.91	3.50	4.37	5.83	6.56	8.74
Pine, Longleaf	.66	9.2	.55	.69	.86	.92	1.00	1.15	1.37	1.72	1.96	2.29	2.75	3.44	4.58	5.50	6.88	9.16	10.32	13.75
Pine, Sugar	.37	11.4	.31	.39	.48	.51	.56	.64	.77	.96	1.10	1.28	1.54	1.93	2.57	3.08	3.85	5.14	5.78	7.70
Pine, Western Yellow	.41	10.8	.34	.43	.53	.57	.62	.71	.85	1.07	1.22	1.42	1.71	2.13	2.84	3.41	4.27	5.69	6.40	8.54
Pine, White	.39	9.9	.33	.41	.51	.54	.59	.68	.81	1.02	1.16	1.35	1.62	2.03	2.71	3.25	4.06	5.42	6.09	8.12
Spruce, Sitka	.38	8.9	.32	.40	.49	.53	.58	.66	.79	.99	1.13	1.32	1.58	1.98	2.64	3.16	3.96	5.28	6.94	7.92
Mahogany, African	.46	5.6	.38	.48	.60	.64	.70	.80	.96	1.20	1.37	1.60	1.92	2.39	3.19	3.83	4.79	6.38	7.18	9.58
Cedar, Spanish	.34	7.3	.28	.35	.44	.47	.51	.59	.71	.88	1.01	1.18	1.42	1.77	2.36	2.83	3.54	4.72	5.31	7.08
Mahogany, True (Cen Am.)	.49	7.9	.41	.51	.65	.68	.75	.85	1.02	1.28	1.46	1.70	2.04	2.55	3.50	4.08	5.10	6.80	7.66	10.20

Weight of glue per square foot. Blood Albumen about 0.3 oz. Certus about 0.4 oz.

same direction, this type of structure is not plywood in the true sense. There are usually but 4 to 6 laminations, each being ¼ to ⅜ in. in thickness. The extra weight of these struts due to the glue is a disadvantage.

Certain kinds of strut frames, such as the "N" type for cabane struts, or the portal for interplane struts, which are capable of taking moment at the corners, and so may replace diagonal or incidence wires, are a combination of laminated and plywood construction. In each member of the frame, for the greater part of its length, the grain of all the laminations is parallel to the direction of the stress, but at the intersection of the members the laminations are dovetailed, producing a plywood construction in which the grain of the adjacent plies is nearly at right angles. A unit frame of this type has considerable rigidity, but is appreciably heavier than the usual combination of single struts and wires. From the military point of view, one of its chief advantages is its ability to transmit by torsion the load from either the front or rear lift trusses, should one of the trusses be shot away, to the uninjured truss. The elimination of drift and incidence wires reduces to a certain extent the air resistance, especially with high speed planes. Another advantage of considerable importance obtained with this type of bracing is the ease with which a wing cell may be aligned. The stagger of the wings, and the decalage, if there is any, is practically fixed. However, in case it is desirable to alter the stagger for some reason, this feature is a disadvantage.

(The writer wishes to acknowledge the value, in the preparation of this article, of certain reports issued by the Forest Products Laboratory for the Bureau of Aircraft Production.)

LIBERTY

A TRADE-MARK REGISTERED BY THE UNITED STATES OF AMERICA

By CAPTAIN WILLIAM L. SYMONS, AIR SERVICE, U. S. A.

A CERTIFICATE of registration of the trade-mark "Liberty" as used on aeroplane engines was granted by the United States Patent Office to the United States of America on June 17, 1919. This is the first instance of the Government of the United States registering a trade-mark under its own trade-mark laws, or the laws of any other country, although other governments have registered their marks in the United States Patent Office for the goods on which they are used. The Republic of France has registered marks used on cigarettes, and several registrations have been granted by the United States Patent Office to the Imperial Government of Japan. Some government activities, such as the War and Navy Department's Commission on Training Camp Activities, have been granted registration of their trade-marks.

Everything connected with the history of the mark "Liberty" as used by the United States on its aeroplane engines is unique. When the Liberty engine was first developed in the summer of 1917 it was referred to by the government engineers as the "United States Standard Aircraft Engine" or the "United States Standard Engine." Some genius, however, selected the right word and all the district offices of the Bureau of Aircraft Production, which was then the Equipment Division of the Signal Corps, were soon notified that the use of the word "Liberty" as applied to the new engine was so popular that it seemed inadvisable to attempt to use any other name. This word was a happy selection.

Trouble resulted in a short time, however, from the great popularity of the word "Liberty" as applied to articles of commerce. Many manufacturers began to designate their goods by the term "Liberty." This use of the term on goods which are of the same general class as engines or on goods adapted to be used on engines resulted in confusion and probably in deception. Government officials soon saw that it was necessary to protect the name. After considering several ways of getting the best protection of the right of the Government in the use of the word "Liberty," the plan of registering it in the United States Patent Office under the United States Trade-mark Law was adopted. These proceedings resulted in the grant of certificate of registration No. 125,853, which under Section 16 of the Trade-mark Act constitutes prima facie evidence of ownership of the mark "Liberty" as used on engines and parts thereof.

Personal Par

Lieut. E. D. Stearns, Aviation, has joined the H. K. Ferguson Co., Cleveland, as sales manager. Lieut. Stearns is a graduate of the University of Illinois, 1907. For several years after completing his engineering course, he was connected as engineer and erection superintendent for the Stephens-Adamson Co., and was later manager of its New York branch. For 6 years previous to his military service, he was a partner in the Ft. Pitt Engineering Co., Pittsburgh.

NAVAL and MILITARY AERONAUTICS

140,000 Miles Flown in June

The work of the Air Service of the United States Army for the month of June in cross-country flying totaled 140,000 miles. This did not include the mileage flying over fields in giving instructions to enlisted men.

Flying Circus of Seven Off On Flight to Texas

Hempstead.—Lieutenant Colonel Harry B. Claggett, who left Texas some time ago to fly to Boston on a recruiting tour of the Eastern States, left July 12 on the return trip to Texas with his flying circus of seven. The first stop will be made at Washington.

In the leading plane was Colonel Claggett as pilot, with Captain William H. Chandler as observer. Behind them come in order, Major John W. Simmons, pilot, with Sergeant Harry H. Altman as observer; Major Roy S. Brown, pilot, with Captain Herman Fluegel as observer; Lieutenant J. E. Duke, Jr., pilot, and Sergeant Wayne Wetzell, observer; Lieutenant Benjamin H. Adams, pilot, and Sergeant James C. Smith, observer; Major Henry J. F. Miller, pilot, and Lieutenant M. John Plumb, observer; Lieutenant Robert F. Medkill, pilot, and Sergeant Ralph Kratz, observer.

Night Altitude Flight

An experimental flight for altitude at night was conducted at Carlstrom Field, Arcadia, Fla., at 10 o'clock, July 10. Lieutenant Charles C. Chauncey in a Le Pere with Sergeant Thomas Cook, as passenger, reached an altitude of 20,000 feet without difficulty.

The weather was clear, the wind from the northwest, speed ten miles per hour, and the thermometer in the rear cockpit of the aeroplane registered five degrees below freezing point. The duration of the flight was eighty-five minutes. At 10:05 P.M. the two airmen observed a second sunset.

Army's Non-Stop Record

Announcement was made since early in April army fliers in this country have made eleven non-stop flights, each exceeding 500 miles. The longest was made by Major Theodore C. Macaulay and measured 852 miles. The fastest was made by Lieutenant R. S. Worthington, who covered 500 miles at an average speed of 166.62 miles an hour. In the same period army fliers have made several transcontinental flights and other long flights in which there were intermediate stops of less than 500 miles each. The record of the notable long non-stop flights is:

April 12. Theo. Macaulay and Sergeant A. W. Allman in a De Haviland-4, from Fort Worth, Texas, to El Paso, Texas, 580 miles, in 345 minutes; 100.86 miles per hour.

April 14. Theo. C. Macaulay and Sergeant A. W. Allman, in a De Haviland-4, from Tuscon, Ariz., to Sweetwater, Texas, 701 miles, in 345 minutes; 121.86 miles per hour.

April 16. Theo. C. Macaulay and Sergeant A. W. Allman, in a DeHaviland-4, from Fort Worth, Texas, to Americus, Ga., 852 miles, in 415 minutes; 123.18 miles per hour.

April 19. Captain E. F. White and H. M. Schaeffer in a De Haviland-4, from Chicago to New York, 725 miles in 350 minutes; 133.80 miles per hour.

May 4. Captain Roy N. Francis, Major W. H. Frank, Lieutenant Coe, T. E. Gilmore and Lieutenant E. E. Harmon, in a U. S. Martin bomber, from Washington to Macon, Ga., 650 miles in 470 minutes; 82.98 miles per hour.

May 17. Colonel G. C. Brant and Lieutenant H. Birkett, in a De Haviland-4, from Houston, Texas, to Belleville, Ill., 720 miles in 453 minutes; 114.8 miles per hour.

May 20. Lieutenant G. H. McKay, in a Curtiss JN-4H, from Belleville, Ill., to York, Neb., 500 miles, in 343 minutes; 86.04 miles per hour.

June 17. Howard Rhinehart and J. E. Talbot, in a De Haviland-4, from Dayton to Mineola, 502 miles in 250 minutes; 120.48 miles per hour.

June 17. Lieutenant R. S. Worthington, no passenger, in an SE-5, from Palo Alto to San Diego, 500 miles in 180 minutes; 166.62 miles per hour.

June 24. Lieutenant G. H. Palmer, Lieutenant G. E. Bradford, and five mechanics, in a Handley Page from Indianapolis to Washington, 505 miles, in 285 minutes; 106.26 miles per hour.

July 7. Captain Lowell H. Smith, no passenger, in a De Haviland Bluebird, from San Francisco to San Diego, 610 miles, in 246½ minutes; 148.44 miles per hour.

San Francisco-San Diego Record

A telegram has been received from San Diego, California, stating that Captain Lowell H. Smith, flying alone in a De Haviland "Bluebird," broke the non-stop speed record July 7 between San Francisco and San Diego by flying the distance of 610 miles in 246½ minutes, which is at the rate of 148.44 miles per hour.



Capt. Edward Laughlin, U. S. A., Engineer Officer at the Dallas Aviation Repair Depot



Lieut. Col. Netherwood, commanding officer of the Aviation Repair Depot at Dallas, Texas

THOMAS H. INCE OFFERS TRANS-PACIFIC FLIGHT PRIZE

THE Aero Club of America has sanctioned the contest for the $50,000 prize offered for the first trans-Pacific flight by Thomas H. Ince. The rules and regulations for the contest are as follows:

"Thomas H. Ince offers the sum of $50,000 to the aviator who shall first complete an aerial voyage across the Pacific Ocean in a heavier-than-air machine, mechanically propelled, of any size and type. Said flight may be attempted from either side of the ocean, but if westward the starting place must be from the Thomas H. Ince Aviation Field at Venice, Cal., or the Thomas H. Ince Hydroaeroplane Station at Venice, Cal., and the finish must be on the mainland of the Japanese group of islands or the mainland of the Philippine group of islands or the continent of Asia; if eastward, the mainland of the Japanese group of islands or the mainland of the Philippine group of islands or the continent of Asia, and the finish must be on the mainland of the United States of America. The course of said flight must be confined to latitudes 49 degrees north, and 32 degrees, 33 minutes, north, of the United States of America, and latitudes 41 degrees, 35 minutes, 20 seconds, north, and 38 degrees, 45 minutes, south, of the Eastern Pacific.

Auspices

"The contest will be conducted by the Aero Club of America, through its official affiliation and representative, the Pacific Aero Club, and shall comply with the rules and regulations of the Federation Aeronautique Internationals.

Time Limit

"The contest shall be confined between the months of September, 1919, and February, 1920, inclusive, and contestants must complete the trans-Pacific flight within two hundred and eighty-eight (288) hours from the time of starting.

Awards

"In the event that no contestant shall successfully complete a trans-Pacific flight, for which the sum of fifty thousand ($50,000) dollars is offered, the contestant starting from the Thomas H. Ince Aviation field at Venice, Cal., or the Thomas H. Ince Hydroaeroplane Station at Venice, Cal., who shall have reached the Hawaiian Islands in the shortest length of time, shall be awarded the sum of ten thousand ($10,000) dollars; and in the event that no contestant shall complete a flight to the Hawaiian Islands, the contestant starting from the two above-mentioned places who shall fly the furthest in the direction of the Hawaiian Islands shall be awarded the sum of five thousand $5,000) dollars.

Qualification of Contestants

"The contest is open to persons of any nationality holding an aviator's pilot license issued by any accredited aero club affiliated with the Federation Aeronautique Internationale, or to persons who have been so rated by any military or naval establishment.

Entries

"The entry form, which must be accompanied by the entrance fee of $500, must be sent to the secretary of the Pacific Aero Club, Monadnock Building, San Francisco, Cal., at least fourteen days before the entrant makes his first attempt. No entrance fee will be required of any military or naval contestant. Foreign entries will make application to the clubs in their respective countries which are affiliated with the Federation Aeronautique Internationale.



Thomas H. Ince signing his personal check for $50,000, which he presented to the City of Venice, Cal., with which to pay the first aviator to cross the Pacific

"No part of the entrance fees are to be received by Thomas H. Ince. All such entrance fees will be applied toward payment of the expenses of the Pacific Aero Club in conducting the contest. Any balance not so expended will be refunded to the contestants pro rata.

Starts

"The start of contestants may be made from land or water, but in the latter case the contestants must cross the coast line at the beginning and end of flight. The time will be taken from the moment of leaving the land or crossing the coast line. Each contestant shall advise the Pacific Aero Club of the proposed date and time of his start, as all starts must be made under the supervision of an official or officials of the above-mentioned club.

Air Mileage

"Ninety-five per cent of the mileage traveled from starting point to finish must be accomplished in the air. Barographs, officially sealed, shall be attached to each aircraft before starting, and opened only in the presence of an accredited representative of the Pacific Aero Club. The recordings of these barographs shall determine the air mileage actually traveled.

Towing

"Towing is not prohibited.

"Stops and landings, either on the water or at any point en route, may be made by the contestants.

Identification of Aircraft

"Only one aircraft may be used for each attempt. It may be repaired en route. Each aircraft will be so marked before starting that it can be identified on reaching its destination.

Finish

"The finish may be made on land or water. The time will be taken at the moment of crossing the coast line in flight or touching land. Each contestant shall advise the Pacific Aero Club of his proposed destination and alighting place.

General

"(1) A contestant by entering thereby agrees that he is bound by the regulations herein contained or to be hereafter issued in connection with this contest.

"(2) The interpretation of these regulations or of any to be hereafter issued will rest entirely with the official committee of the Pacific Aero Club.

"(3) The contestant shall be solely responsible to the officials for the due observance of these regulations, and shall be the person with whom the officials will deal in respect thereof, or of any question out of this contest.

"(4) A contestant by entering waives any right of action against the Federation Aeronautique Internationale, the Aero Club of America, the Pacific Aero Club

(*Continued on page* 906)



A view of Venice, Cal., from whence the aviators will fly for the Ince $50,000 prize

FOREIGN NEWS

Noted Swiss Flier Killed

Oscar Bider, reputed the leading Swiss flier, was killed July 5 in a fall from a height of 3,000 feet near Zurich. Bider, who was the chief pilot of the Swiss army, was performing acrobatic stunts preparatory to a public exhibition. Oscar Bider was one of the first to fly across the Bernese Alps, having made several trips over the mountains in 1913. In the same year he flew across the Pyrenees from Pau, France, to Madrid.

A New British Rigid Airship

According to notices appearing in the daily press, the new rigid airship, R-39, now under construction at the works of Sir W. G. Armstrong Whitworth & Co., Ltd., Barlow, near Selby, Yorkshire, is to have an overall length of 685 feet, a maximum diameter of 85 feet and a gross lift of 80 tons. The power plant is said to consist of six engines of 350 horsepower each, and it is hoped that the speed attained will be over 70 miles per hour.

A 900 H.P. Sunbeam Engine

According to the *Daily Express* of May 11th, the Sunbeam Motor Car Co., Ltd., have just made preliminary tests of a new 12-cylinder "Vee" type engine of 900 normal b.h.p.

No other information is as yet available.

Aerial Progress in Australia

Mr. R. Lloyd's aerial survey party have arrived at Burketown, Queensland, after a very rough journey of 2,550 miles across country from Sydney to the Gulf of Carpentaria. They located aerial landing stations and relay and fuel depots on their route, each 390 miles apart, so that a chain of landing stations from Sydney through Queensland and along the Gulf route is now completely charted except for the Darwin site, which will be chosen at the end of the survey party's journey. There is to be a station at Borooloola, in the Northern Territory. An alternative interior route will be surveyed from Camooweal to the Catherine River by way of the Newcastle waters and across the heart of the Northern Territory.

Civil Aviation in Brazil

According to *Auto Propulsao*, of May 15th, the Brazilian Minister of Communications has authorized the publication of official instructions relative to interstate and foreign aerial transport service in Brazil.

The principal points of the regulations are summed up as follows:

The network of aerial communications will cover all the State capitals, but concessionaires may, with the permission of the Government, extend their services to other cities if it is found to be desirable on commercial or industrial grounds.

Two years will be allowed to concessionaires for organizing connections between capitals.

Concessions carry no monopoly of any kind; they will cover aerial transport of passengers, mails and small parcels as soon as it is considered sufficiently safe.

The obligatory number of journeys, fares and rates are to be fixed by schedules agreed upon with the Government.

No letter or publication may be carried without proper postage stamps.

No passenger or goods service is to be started without previous license of the Federal Government, which will regulate the conditions of the service under its own direct inspection and supervision.

Concessionaires will be obliged to admit to their workshops and upon their machines cadets of the National Flying Services.

Concessions will be granted for a period of ten years, and concessionaires must undertake to fulfill any obligations ordered by the Government in the future, without any claim to indemnity, in so far as relates to questions involving aerial dominion or the national security.

After two years the Government may order that all commanding officers, pilots and crews of aircraft engaged in such services shall be Brazilian citizens and that the aircraft employed shall be registered as Brazilian at the Inspection Department of the Marine and River Transport Department of the Ministry of Communications.

Aerial Pleasure Service in England

It is understood that arrangements have now been completed for an aerial pleasure service to be run at Brighton during the summer. Land machines and seaplanes will be used, and permission has been granted for the machines to use "The Ladies' Mile" at the north end of the town as a landing ground. A rental of £15 per season will be charged for this ground, and each seaplane will be charged 10s. per week.

An Interesting Career

The fame of the Rolls-Royce engine, to which the trans-Atlantic flight has added further laurels, makes interesting the identity of the man responsible for its creation. Yet of all the men whom the motor movement has pushed into the limelight of prominence, it is doubtful if there be one whose personality is so unknown as Mr. F. Henry Royce, M.I.M.E., M.I.E.E., etc., to whose fertility of invention and creative genius the Rolls-Royce owes its unrivalled position in the world to-day.

Born in 1863, the son of a farmer in South Rutlandshire, he was obliged to begin work at an early age owing to the death of his father, who for a few years previous to his death had been the technical expert for a steam flour milling concern. The insight into mechanics afforded by his father's occupation gave young Royce his first incentive to engineering, which was subsequently to make his name world-famous. A few years' apprenticeship at the G.N.R. locomotive works at Peterborough, during which time he devoted himself to the study of mechanical science at the City Guild Technical College under Professors Ayrton and Perry, laid the foundation of his acquaintance with practical mechanics, which has since served him and the motor movement in such good stead.

In his eighteenth year he obtained employment at Leeds as an engineering fitter, and worked long hours building and testing machines for the Royal Italian Arsenal, then being built. Before his twentieth birthday he had removed to London, and from the parent company was sent to Liverpool to be chief electrical engineer to the Lancashire Maxim and Weston Company in that city.

The firm of Royce, Limited, was started in 1884, when its founder was of age, in conjunction with Mr. Ernest A. Claremont, of Manchester. From very small beginnings, making arc lamps and dynamos, the firm subsequently branches out into electromotors and electrically driven cranes, in connection with which the name of Royce is famous to this day. The large electrically driven Goliath cranes are perhaps the best known of Mr. Royce's productions in this line.

It was not until 1903 that he turned his attention to the motor industry, on the invitation of the late the Hon. C. S. Rolls, the outcome being the formation of the firm of Rolls-Royce. From the little 10-horse-power car which first carried the colors of Rolls-Royce to the enormous Vickers "Vimy" aeroplane, propelled by two Rolls-Royce "Eagle" engines across the Atlantic, it has been the brain of Mr. F. H. Royce which has worked out every minute detail of development and perfection which pertains to the name of Rolls-Royce.

Nor is this renown a matter of appropriating the work of subordinates, as too frequently happens in the case of much advertised geniuses. Mr. Royce is a man who can and does handle any tool like a craftsman, but he is, moreover, equally fertile in designing improvements in tools, as every mechanic in the great works at Derby can bear witness. But more valuable still than personal handicraft is the faculty he possesses of selecting the best men to carry out his designs, to which is largely due the super-excellence of every minute detail of the Rolls-Royce engine and car.

In South Africa

A commercial aviation company, with an initial capital of £100,000, has been started at Johannesburg. Services will be run at the end of the year between Johannesburg, Pretoria, Maritzburg, and Durban.

The largest machine will carry 24 passengers and about 500 pounds weight of parcels. The fare from Johannesburg to Durban, as far as can be estimated at present, will be about £10, and the parcel rate 1s. per lb. As soon as regular services are in operation the company will tender for the carriage of mails.

The following are comparisons of the times taken respectively by train and estimated to be taken by aeroplane between various towns.

	By Train.	By Air.
Capetown to Pretoria, 1,001 miles.....	47¾ hr.	9 hr.
Durban to Pretoria, 519 miles.....	24 hr.	4 hr.
Pretoria to Johannesburg, 39 miles.....	80 min.	30 min.
Bloemfontein to Johannesburg, 290 miles..	11½ hr.	3½ hr.

A flying school is about to be opened in Johannesburg, the course lasting about six weeks, and including 20 hours' solo flying, ground instruction, care and maintenance of aircraft, map-reading, cross-country flying, and aerial navigation.

In Brazil

The Brazilian Minister of Transport has instructed the Department of Maritime and River Transport to study the conditions of aerial transport in order to draw up regulations regarding aerial navigation in Brazil.

It is reported that an Italian-Brazilian company has been formed for the purpose of establishing aerial communication in Brazil, and have entered into negotiations for concessions to that end from the Ministry of Transport.

It is proposed to commence with a service between Rio Grande and Porto Alegre.

The machines to be used will be Caproni seaplanes—"much less perilous than aeroplanes," as the Brazilian paper puts it.

Concessions have been granted by the Brazilian Government to: Senors Joao Lexeira Soares and Antonio Rossi to institute aerial transport services between the principal cities of Brazil. (Decree No. 13,244, October 23, 1918.)

Sonors Joao Baptista dos Santos and Augusto de Aranjo Goes to use aerial means of transport—including seaplanes for the transport of passengers and goods in Brazil.

New Swedish Aerodrome

It would appear that Sweden is really out to develop commercial aviation. A message from Gothenburg states that negotiations are being carried on for the purchase of a number of farms on the island of Hisingen, opposite Gothenburg, with the objeet of establishing a flying port.

To Check Forest Fires

Definite steps are now being taken in the direction of organizing patrol over Canadian forests. A seaplane has arrived in the St. Maurice valley from Halifax, while a second is due to arrive shortly. Arrangements are being made by the St. Maurice Valley Forest Protective Association to provide centres throughout the forest areas controlled by them with constant patrols of aeroplanes so as to signal immediately a forest fire is discovered to wireless stations and secure prompt assistance. Active support is being given to this work by the Dominion Government, as it is believed that it will prove the best plan yet adopted for the prevention of forest fires.

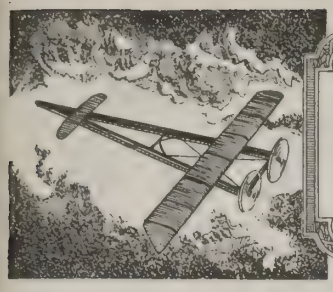
Aircraft Insurance Profits to be Divided

London.—The Aviation Insurance Association is stated to have decided to share its profits with its policy holders. It appears that some owners of aircraft think that the rates charged for accidental damage at present are too high, but if this should be proved to be so, the objection will be removed by the participating policy whereby excessive profit (if any) will be returned to the insured.

By this scheme the insured will participate in 50 per cent. of the profit derived from aircraft damage insurance business. The whole of the premiums derived from participating aircraft business will be pooled, and the insured will, as soon as the underwriting accounts for the year have been closed, participate in the above proportion of the profits according to the amount of the premiums he has paid. In no case, however, will the amount payable under this scheme be more than 75 per cent. of the actual profit on the policy in question, and where a policy has made a loss to the underwriters, there will, of course, be no return made.

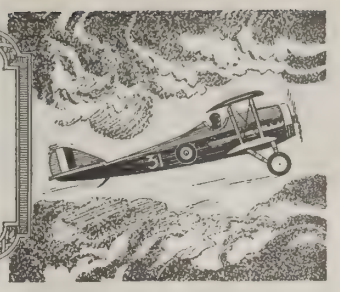
The accounts being made up only when the risks of the underwriting year have been closed, no provision is necessary for unexpired risk or for outstanding claims, and the amount of profit can be calculated therefore on a very simple basis.

The scheme is one which should appeal to owners of aircraft, who will be assured that should experience prove the rates quoted to be excessive, they will be corrected in this simple manner.



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



Scale Models for the Aerial Age Cup

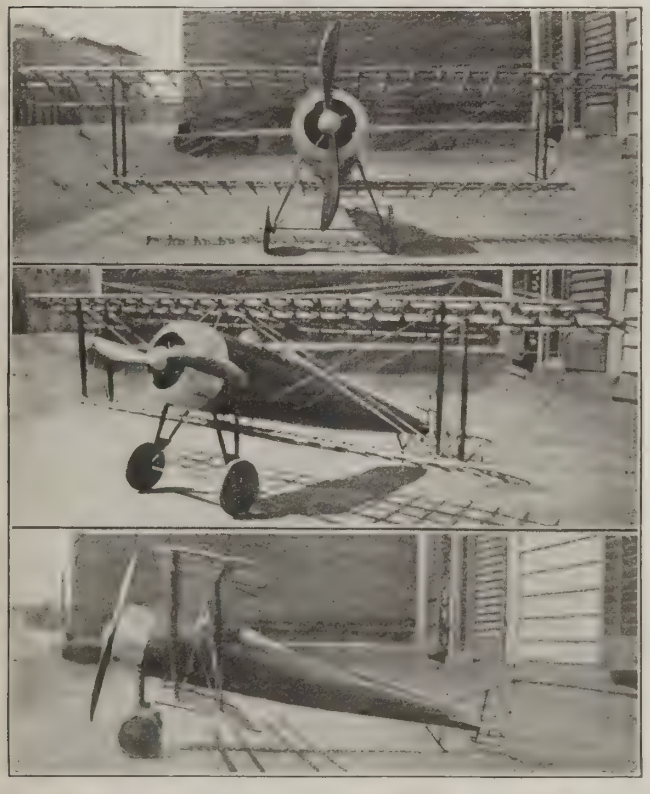
Many interesting photographs have been received at this office, and some of them are illustrated on this page. As it is impossible to reproduce pictures of all the machines at the present time, only those which show especial merit will be printed now, the others will be described when we have the available space. Those who have not as yet sent in their photographs have another week in which to do so, but July 21 will be the last day photographs will be accepted, as some of the model builders who were first to send in their designs are getting anxious to read the winner's name.

Since the prizes were shown on this page recently, many new entries with full descriptions have come into the office. Please write a full description of your model and send it in to the Model Editor with a clear photograph. Do it now in order to reach this office by next Monday morning at the latest.

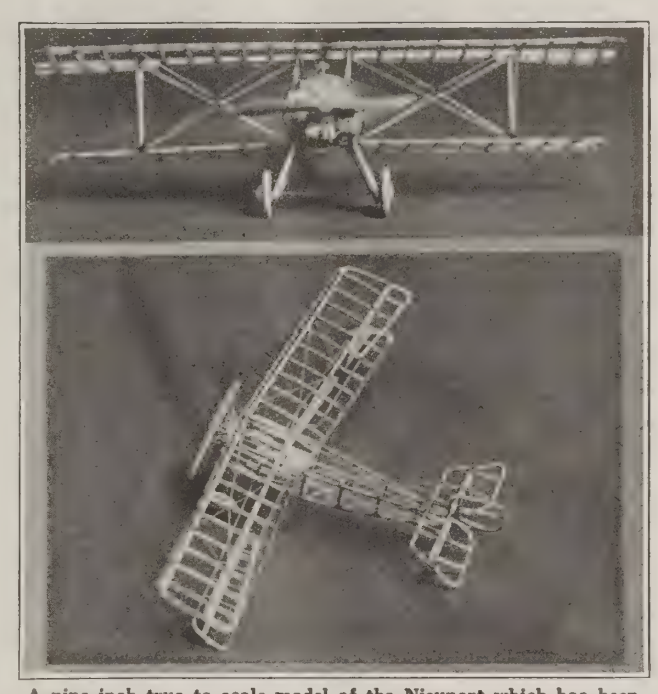
Model of the Berckmans Speed Scout

The model shown at the left side of the page is of the Berckmans Speed Scout, which was described in AERIAL AGE some time ago. This machine performed very well in the hands of Mr. Bert Acosta at Central Park, L. I., making a speed of 115 M.P.H. with only an 80 H.P. Gnome engine. It was later flown at the Sheepshead Bay Speedway by Joe Stehlin, an American who was in the French Flying Corps, on his return to this country.

The builder of this machine, Mr. Harry Smalline, 227 Lewis Avenue, Brooklyn, N. Y., was also one of the Berckmans mechanics, and for that reason not a thing is missing from the model that is on the big machine. You will see that even the ribs are made exactly as a big aeroplane's ribs are made, and the turnbuckles are right and left as you will find on the big machine.



Scale model of the Berckmans Scout made by Harry Smalline of Brooklyn, N. Y.



A nine inch true to scale model of the Nieuport which has been whittled with no other tool but a jack knife

The general specifications are as follows:

Span, upper plane	5'-2"
Span, lower plane	4'-1"
Chord, both planes	8½"
Stagger	15°
Length overall	3'-8"
Weight	6 lbs.
Engine	A dummy model of the Gnome 80 H.P.

The fuselage is of the monocoque type, built up of 3-ply veneer with a fine tapered streamlined form. The laminations are 1/40 of an inch thick with coarse mesh fabric between to keep glue from shearing. A stick control is fitted for the ailerons (Nieuport type) and the elevator. A foot bar is installed for the rudder. The "I" beam main spars can be seen from the photograph. And in fact nothing has been left out which is on the original Berckmans Scout.

Model of the Nieuport Scout

Here is another interesting model from an educational standpoint, inasmuch as this model was made with a pocket knife by a lad from Lincoln, Nebraska. The model is made to scale and so well proportioned that the people of Nebraska think this boy will turn out to be a great aeroplane builder. The model is only nine inches across, but every part is constructed perfectly even to the wing curve. The motor is a dummy made up of a round piece of wood for the crankcase and smaller pieces of wood for the cylinders. The model is built up of spruce and bamboo. It caused such a sensation in Lincoln that Captain Horace B. Wild of the Flying Corps gave the model and its builder a five column write-up in one of the local papers. It was constructed by Master Willard Woods, 2311 South 14th Street, Lincoln, Nebraska. Master Woods is about to build a large machine and is backed by some influential people of his town.



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

R. F. C. Slang

(R. Stanley Edwards in *Flying*)

It was on the flying-ground.

"See the tripehound zooming ceilingwards yonder?" inquired the young pilot, those wings still thrilled him each time his eyes lighted on them. "That one there—way beyond the old eggbeater. Can't you see the one I mean? Hoicking toward the K. B. ahead of her? There! Right above that ground-louse. Got her? Well, she's skippered by Nicholson, the chap who yanked off that stunt in the tabloid. You've read about it, of course. Crashed by a coalbox he was—got his windstick plop and made him take a toss, all out. She flattened, however, and hoicked him into the sea unhurt."

The day old Quirk smiled feebly. He had understood about two words, but knew the other was being amiable.

"What happened," he asked, noncommittally.

"Oh, he was yanked out. But he had stark vertical breeze for months after," and the pilot strolled away, tired of doing the honors.

(In order to make possible the translation of this specimen of "Flyese," our British contemporary, *Flying*, has published the following list of aeronautic slang phrases, with which some of our airmen are no doubt familiar.)

Air Terms and Slang used by both R. N. A. S. and R. F. C.

Flyese	Meaning
Busses	Aircraft of all kinds.
Dope, Engine Juice	Petrol or other motor spirit.
To Zoom	To shoot up in a plane.
To Hoick up or down	To rise or descend quickly in a plane.
To Flatten Out	To bring the machine parallel with the ground before landing.
Archibald or Archie	Anti-aircraft guns, British or enemy.
Fritz or Coalbox	German shell.
Skipper	Pilot.
Tripehound or Tripe	Triplane.
Flaming Onions	German rockets or projectiles used for anti-aircraft purposes and sent up in strings.
Gadget	Accessory, fitting, anything difficult to rememebr or define.
Super-gadget	The latest thing in fittings.
Joy Stick	Control lever.
Wind Stick	Propeller.
To get "Vertical breeze or "Vertical gust"	To "get the wind up," to be scared, to have cold feet, to have nerves after a spill.
Spin	Twisting flight.
A Flip	A journey in the air.
K.B.	A sausage or kite balloon.
To take a Toss	To have a spill.
Stunt	Trick, dodge, fancy-flying, intricate airmancraft. Used for everything in the air and on terra firma.
To Crash	To fall. To come down with a rush.
Ceiling or Roof	The greatest height at which it is possible to fly.
Cold Feet	See "Vertical breeze."
To Yank	To pull.
For Bombs to *"Straddle"*	To drop on each side of the object aimed at.
A Tabloid	A single-seated Sopwith scout biplane.
All Out	Full speed ahead.
To Snooker or Stymy	To "make a bloomer" or to "do a man in."
To "Get his Wings"	To graduate as a pilot.
To "Get his Ticket"	To get his Aero Club pilot's certificate.
Plop	Whack.
Ferry Pilot	A pilot who takes planes from one aerodrome to another or across seas.
Stunt Pilot	A clever trick-pilot.
Unstrafed	Unbeaten, unpunished.
To Peter Out	For an engine to stop.
To Miss a Prop	To lose the prop for the propeller, to stop dead.
Rupert	Kite balloon.
Traveling Circuses	Specialized German fighting squadrons.
A Noah-Cæsar Bus	An antiquated machine.
To Blaze the Trail	To strike out in a certain direction.
On the Silvery Side	Above the clouds.
Dromewards	Homewards.
Fokker	An obsolete German.
Stark	Absolute.
To Stall	To lose one's flying speed when control is likely to be lost.
Tailslide	To come down backwards in a plane.
Spiral Dive	To come down corkscrew-wise.
Fraternity Jacket	Airman's tunic.
Rumpety	School plane.
Egg-beater	A twin propeller Wright-type machine.



Obstruction—From "Flight"

(To be continued)



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Lieutenant Fetters Makes First Flight Across the Cascade Mountains

The War Department was notified July 5 that Lieutenant Jay M. Fetters, flying from Portland, Ore., to points in Oregon, Washington, and Idaho, where the aeroplane had never been seen before, had reached The Dalles on the return trip, having covered 1,457 miles in 1,130 minutes. He was the first aviator to cross the Cascade Mountains, making twenty-five landings.

Captain Howell H. Smith, in a De Haviland Bluebird plane, on his flight from San Francisco to Ogden, Utah, averaged for the distance of 693 miles a speed of 133 4/5 miles an hour, and on the return trip to San Francisco he covered a distance of 655 miles at an average speed of 130 7/10 miles per hour. He flew at an altitude of 9,000 feet.

Dodd Commands Langley

Colonel Townsend F. Dodd, Military Aviator, took command of Langley Field, Va., post, Colonel Wm. Hensley, Jr., being granted leave of absence to sail on the Dirigible R-34. Colonel Hensley is a Balloon Observer, dirigible pilot, and heavier-than-air J. M. A.

Air Service Leads

Men of the Air Service in the Army received more Distinguished Service Crosses than those of any other branch of the service, with, of course, the exception of the infantry. Official announcement made by General March, Chief of the General Staff, shows that 3,819 crosses were awarded to Air Service men. The Medical Corps came third, and then, in order, the Artillery, the Engineer Corps and the Signal Corps.

Curtiss Banquet to NC Crews

The grand ballroom at the Hotel Commodore was fitted up on the evening of July 10 to the last detail as the cabin of an NC flying boat, in which was served a dinner for the officers and crews of the NC-4, NC-3 and NC-1. Other guests were military and scientific experts who helped in the development of the first machine to fly across the Atlantic.

Glenn H. Curtiss, for whose name the "C" in NC stands, was the host.

The "cabin" in which the diners seated themselves was that of the "NC-9" bound from New York to Plymouth, England, in May, 1920. Along the sides were ports through which could be caught glimpses of a swift panorama of cloudland, through which occasionally drove other flying boats or huge dirigibles. At intervals the sea, remotely rippled by the gale on which the "NC-9" drove along, appeared through gaps in the clouds.

There was even a wireless, operatod by Jack Binns, who sent the "messages" received to the guests for whom they were intended by a feminine Jack tar. There was nothing feminine, however, about the bo's'n whose preliminary calls: "All hands stand by to get under way!" and the like, followed by the officers' call on a bugle, gave an aeronautical air of expectancy and departure to the ballroom.

Quite appropriately, the fish was served just as the "NC-9" reached "midocean" and was gathering in wireless gossip from both hemispheres and the upper and nether world. The diners drank a silent toast in ice water when Brigadier General Charlton, British air attaché, received a "message" from General Maitland aboard the R-34 making an appointment for a meeting at the Savoy bar.

Another "message" from the R-34 warned the NC-9 to keep to its own side of the road and not go cluttering up other folks' sky.

"For goodness' sake," scolded the big dirigible, "keep clear of our track and follow the road laid down by the Bureau of Navigation!"

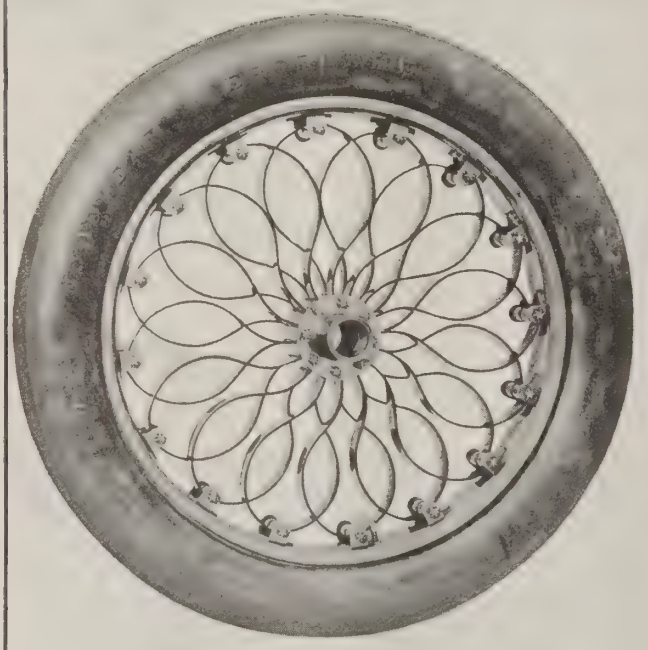
There was a masque showing the development of navigation from the time of Columbus to that of the "nancies" and souvenirs in the shape of books and medals were given to each guest in commemoration of the first transatlantic flight. In addition, each member of the three crews received a gold watch, engraved upon the back with an inscription concerning the flight whose dial guard formed the letters "NC."

Irvin S. Cobb was toastmaster. Among the others present were Lieutenant Comamnder A. C. Read, commander of the NC-4; Commander John H. Towers, of the NC-3, flight-commander; Lieutenant Commander P. N. L. Bellinger, of the NC-1; Chief Special Mechanic E. Harry Howard, engineer of the NC-4, who was unable to make the flight because of an accident just before the start, which cost him his hand as well as the trip; Admiral James H. Glennon, Captain Powers Symington, Noble E. Irwin, Dr. A. F. Zahm, C. M. Manley, Frank H. Russell, J. N. Willys, Captain Norman P. Hall and Commander R. W. Cabaniss; Admiral D. W. Taylor, Commander G. C. Westervelt and Commander Jerome Hunsacker, all of the Naval Bureau of Construction and Repairs, and W. L. Gilmore, Commander H. C. Richardson and Henry Klelckler, who were associated with the members of the bureau in designing the NC-4.

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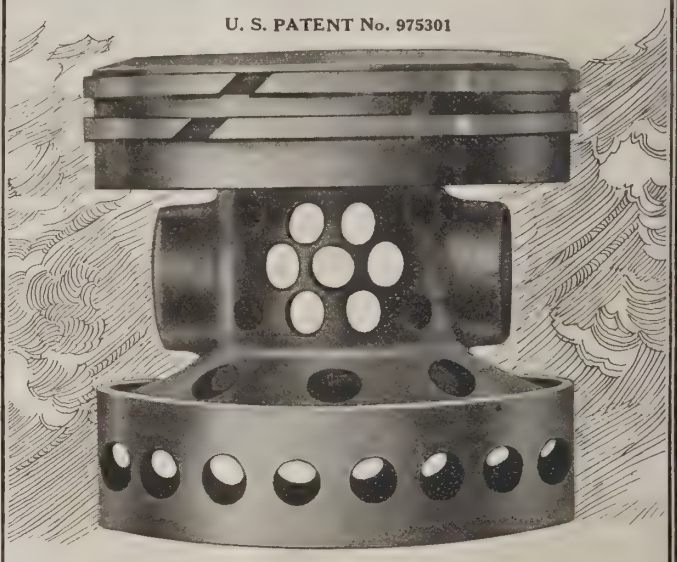
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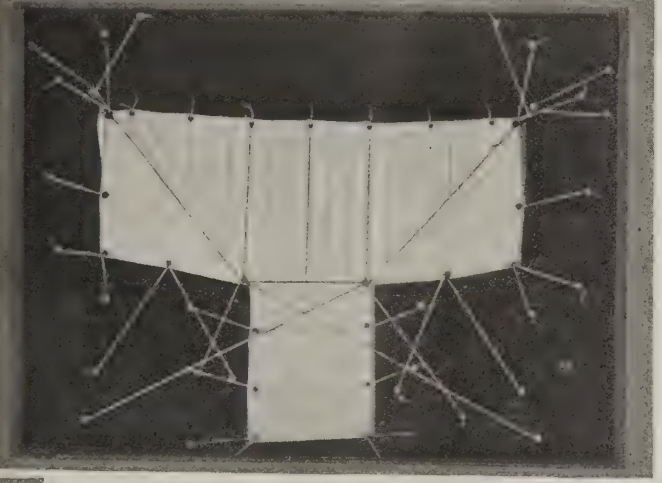
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(*Continued from page* 888)

national advisory committees were constituted to study these subjects as follows:

1. Mechanical Tests. Definitions of terms used in the heat treatment and testing of steel.
2. Chemical Analysis. Methods of analysis of metals for use as a reference.
3. Tolerance on Bars. (For sizes of bars in both metric and British measure.)
4. Magnetos. Interchangeability of complete magnetos.
5. Sparking Plugs. Interchangeability.
6. Propeller Hubs. Interchangeability of propeller and hub.
7. Ball Bearings. Interchangeability and sizes.
8. Axles, Hubs, Rims, Tires. Interchangeability and sizes.
9. Electrical. To consider what electrical apparatus should be interchangeable.
10. Steel Tubes. Interchangeability and sizes.
11. Tests on Wood. To obtain agreement on methods of tests.

These advisory committees will meet from time to time in order to prepare proposals which, after having been referred to and agreed upon by the national committees, will be submitted to a plenary meeting of the Commission for adoption and issue as International Aircraft Standards.

Note in Regard to Formation of National Committees

In most countries there now exists, or is in process of formation, an Engineering Standards Association, the object being to centralize, as far as possible, in one authoritative organization the standardization of engineering and allied materials. Such bodies are generally divided into various Sections dealing with the different branches of the engineering and allied industries. For instance, in France, Great Britain and the United States, the Committee of the Standardizing Authority for the country, controlling the aircraft section has been officially nominated as the National Committee of the International Aircraft Standards Commission.

In the case of Great Britain, the British Engineering Standards Association has 24 Sectional Committees controlling the national standards of all kinds of engineering and allied material including an Aircraft Section. The Aircraft Sectional Committee has some 60 Sub-Committees and has in operation over 200 Specifications for aircraft materials, prepared and kept up to date by these Sub-Committees. This Section being now the British National Committee of the International Aircraft Standards Commission, it has therefore at its disposal the work of all these Committees as well as the work of every other Sectional Committee interested. This plan is being adopted in America and France and seems likely to be universally adopted.

(*Continued from page* 899)

or Thomas H. Ince for any damages sustained by him in consequence of any act or omission on the part of the officials of any of the above-mentional clubs or Thomas H. Ince or their representatives or servants or any fellow contestant.

"(5) The aircraft used shall be at all times at the risk in all respect of the contestant, who shall be deemed by entry to agree to waive all claim for injury either to himself or his passengers or his aircraft, or his employees or workmen, and to assume all liability for damage to third parties or their property, and to indemnify the above-mentioned clubs and Thomas H. Ince in respect thereof."

Personal Pars

William Knight, formerly assistant mechanical engineer of the Crocker-Wheeler Company, Ampere, N. J., and during the war a first lieutenant in the Air Service, U. S. A., has recently been appointed technical assistant to the National Advisory Committee for Aeronautics in Europe, with headquarters in Paris, France.

H. R. Trotter, formerly chief engineer of the S K F Ball Bearing Company, has been appointed chief engineer of the S K F Industries, Inc., New York. The S K F Industries, Inc., has recently been organized to supervise the sales and engineering activities of the Hess-Bright Manufacturing Company, the Atlas Ball Company, the S K F Engineering Laboratories and the S K F Ball Bearing Company.

G. Edward Barnhart has resigned as chief engineer in charge of the production of Handley Page planes at the plant of the Standard Aircraft Corporation, Elizabeth, N. J., and has accepted the position of mechanical engineer in the experimental engineering department of the B. F. Goodrich Co., Akron, Ohio.

Edward L. Jones, who has been associated with the sales departments of the Remy Electric Co. and Standard Parts Co., has been appointed special factory representative of the Perfection Heater & Mfg. Co., Cleveland, Ohio.

O. F. Kropf, secretary-treasurer, Findeisen & Kropf Mfg. Co., Chicago, Ill., has been elected president of the recently formed Beneke-Kropf Mfg. Co. The new organization has succeeded the Findeisen & Kropf Mfg. Co. and will continue the manufacture of the Rayfield carbureter.

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The Aerial Pathfinder

Air Department To Be Urged

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LARGE DEMAND FOR AEROPLANES

THERE are over 500 people who have purchased or ordered an aeroplane in the United States during the past three months, and not less than 500 more are anxious to place their orders but cannot do so because the manufacturers are rushed with orders and cannot promise deliveries.

This is one of the important facts ascertained by the committee in charge of organizing the Pioneer Aeroplane Tours.

The Curtiss Company alone has orders for over three hundred aeroplanes, and is so rushed with prospective orders that it has found it necessary to put on two shifts in its factories at Garden City and Buffalo.

Over 130 orders have been received by the Curtiss Company for the pleasure type biplane called the "Oriole," because it is painted like an oriole. The Curtiss Company already has more orders than it can fill this summer for pleasure type seaplanes of the type called the "Seagull." The Curtiss factories are turning out an average of one a day of both the "Oriole" and "Seagull" types. The orders for planes range from the one-passenger type to the ten-passenger type, with a few orders for larger machines. The passenger carrying business is also flourishing and there is a large demand for aerial passenger carrying transportation lines. Every day people wait in line for an opportunity to take a flight in a flying boat down the Boardwalk toward the Inlet, where there are three flying boats in operation, carrying passengers from morning till night. It is a common sight to see a man or woman in a hotel talking wildly and waving their hands to illustrate the motions gone through in making an aeroplane flight with one of the aviators at the Atlantic City Airport.

It is unfortunate for the aeronautic movement that the manufacturers are not in a position to make the necessary deliveries of aeroplanes. Not less than 2,000 pleasure machines could be sold immediately if the manufacturers were in a position to make deliveries.

Fortunately for the aeronautic movement, the several thousand planes which the Government has sold and other planes which the Army and Navy may sell in the near future, will soon be available. They will be available for the Tours, which promise to start with a surprisingly large number of entries.

DEMORALIZING THE ARMY AIR SERVICE

UNLESS some sudden readjustment occurs the Army Air Service faces absolute demoralization, and all of the upbuilding work of the past two years, and the money expended, will have been for nothing. The New York *Times* discusses the situation as follows:

"The Air Service of the army faces demoralization as a result of orders issued by Secretary Baker, through the Adjutant General of the army, calling for the discharge of all temporary officers in the army by September 30. Secretary Baker and General March found themselves confronted, as a result of the slashes made by the Republican Congress, in the estimates for the support of the army, to order the discharge of all emergency appointment officers on or before September 30. The result will not only rob the service of some of its best fliers who entered from civilian life, but also force the abandonment of important army aviation projects.

"The Army Appropriation act carries a total of $25,000,000 only for army aviation. Men in charge of plans for army aviation development asserted that the army plans called for a minimum of $55,000,000 for the current fiscal year, or a maximum of $75,000,0000.

"With the discharge of all temporary officers by September 30 the army aviation stations in Hawaii and Panama will have to be abandoned, as well as the proposed Philippine aviation project, as there will be scarcely enough regular army officers to maintain even two squadrons on the Mexican border. It was asserted by officers of the Air Service that as a result of the situation now staring it in the face, no provision can be made for properly taking care of the millions of dollars' worth of aviation property at Government fields and in storage ports, that it will be impossible for the army to maintain a proper system of aviation coast defense, that it will not have sufficient fliers left to properly train personnel, that it will be without a proper administrative or executive force, and will be without any lighter-than-air facilities for more than one company.

"Men prominently identified with the army and interested in aviation regard this condition of affairs as being nothing short of deplorable. It is estimated that it cost the Government more than $10,000 a man to train its fliers. Ten fliers who entered the army from civil life for the period of the war have already signed contracts to go with private companies at approximately $100 a week to fly and do stunts at State fairs and in other kinds of exhibitions. These were lieutenants who were willing to remain in the army air service at $1,700 a year.

"On July 12 the Army Air Service consisted of 4,851 officers, including the Director of the Air Service; 417 officers awaiting discharge, and 369 on detached service. On the same date it comprised 14,413 enlisted men. There are now 1,319 overseas officers, rated as follows: Six hundred and six fliers, 678 nonfliers, 36 balloonists, and 3,859 enlisted men. The regular army enlisted men now in service number 7,365, but there are only 222 regular army officers in he Air Service. The rank and status of these regular army officers are:

	Fliers.	Nonfliers.
Major Generals	..	2
Brigadier Generals	2	..
Colonels	17	19
Lieutenant Colonels	50	21
Majors	66	21

Captains	8	6
First Lieutenants	6	4
Second Lieutenants	..	..
Totals	149	73

"This total includes thirteen who are balloonists and six who are observers. The officers now available in the United States are:

Fliers	1,269
Non-fliers	1,378
Balloonists	99
Total	2,746

"The great bulk of these, however, are temporary officers, who will be discharged from the service before September 30. The 222 officers of the regular establishment to be retained are not enough for three squadrons, exclusive of officers detailed for training, coast defense, and insular possessions. Projects having the approval of the army as of July 12, which will of necessity, it is asserted, have to be abandoned if the present orders for discharge of all temporary officers stand, are:

"Philippine project calling for four observation squadrons—Each squadron of this project called for a war strength of 45 officers, of which 41 would be fliers; total required, 164 fliers and 16 non-fliers.

"The Hawaiian project—One squadron already stationed there, two more authorized; total required, 123 fliers and 12 non-fliers.

"The Panama Project—One squadron, already stationed there, two more authorized; total required, 123 fliers and 12 non-fliers.

"The Border Patrol—Two squadrons operating, four more authorized; total required 246 fliers and 24 non-fliers.

"These projects alone required 656 fliers and 64 non-fliers.

"Forty-two balloon companies also were authorized and contemplated in the army's plans. These called for eight officers for each company, of which five were to be observers. The total number of officers required for approved projects was: Heavier-than-air, 656 fliers, 64 non-fliers; lighter-than-air, 210 fliers, 126 non-fliers. Total required, 866 fliers, 190 non-fliers.

"To meet this there is at present a regular army strength of 222 officers, consisting of 130 heavier-than-air pilots, 18 balloon pilots, 6 observers, 73 non-fliers.

"If existing orders are carried out the shortage on September 30 will be: Heavier-than-air pilots, 526; lighter-than-air pilots, 197; non-fliers, both branches, 117. Total, 840.

"This is the situation that has created demoralization in the Air Service of the army."

AIR DEPARTMENT TO BE URGED

SECRETARY OF WAR BAKER will be strongly urged soon to recommend to President Wilson and to Congress that control of aviation be taken from the army and navy and centered in a new department that may be headed by a cabinet member.

This statement was made to representatives of the New York press by members of the Aircraft Mission that returned on the Aquitania after an extensive tour of the aircraft factories in England. The mission comprised: Assistant Secretary of War Benedict Crowell; Colonel Blair, of the general staff of the army; Captain Mustin, U. S. N.; George W. Houston of the Wright-Martin Aircraft Corporation; C. W. Keyes, of the Curtiss Aeroplane and Motor Corporation, and S. S. Bradley, general manager of the Manufacturers' Aircraft Association.

"What we have seen abroad during the last several months has convinced us of the absolute necessity of a radical departure by America in aviation," said one of the group. "The War Department may be expected to recommend, and the Navy Department undoubtedly will concur, that aviation be made a branch of service entirely distinct and separate from the army and navy.

"The new Government Department of Aviation, to call it that for the moment, is to have control of all aviation in this country, including commercial enterprises in the air. In time of war the War Department can requisition the Aviation Department for so many planes and dirigibles and balloons, and the Navy Department can do likewise. In time of peace the new department can direct the development of American aviation, military, naval and commercial.

"If we are to catch up with the European nations, who have already far outstripped us in that field, and who are drawing further away every day, we must adopt this new program of control.

"Though the NC-4 made the first trans-Atlantic flight, the fact remains that it is Britain that has achieved the great successes of the air in recent months. And Britain's aviation program is almost spectacularly tremendous. France, too, is ambitious, and Italy is ahead of us.

"It is discouraging to those of us who have been in close contact with Europe's great program and brilliant air progress to learn that Congress is apathetic to our own aviation development. The thousands of resignations of aviators from our air service is a blow to our development in that line. There is no doubt whatever in the minds of those who have participated in this war, particularly those who have themselves been in America's air service, that the future, both in war and in peace, will find aviation a supreme factor in shaping the history of the nations. America, therefore, cannot afford to be a laggard if we are to retain our position among the great powers.

"There is also to be considered this important fact, that creation of a new department to take over entire control of all American aviation would do away with duplication of expenditures and result in a saving annually of hundreds of millions, perhaps billions, of dollars."

SPOKANE OFFERS EXCELLENT FACILITIES TO AVIATORS

NO city in the United States is more keenly alive to the possibilities of aviation than is Spokane. Already marked progress has been made, and well defined plans are afoot to place flying on a practical, commonsense basis.

The Spokane Flyers' Club has been launched with a membership of 30, all former officers in the army aviation service. Some of the members have flying records of 500 to 1,000 hours. It is believed the membership will shortly be 50. One aeroplane has been purchased, a Curtiss training machine, so that members may keep in training.

The personnel of the Spokane Flying Club, together with 60 other ranks from the army aviation service, form the first National Guard aviation squadron to offer its services to the Government. The organization is complete and ready to "carry on" as soon as Congress supplies the necessary machinery to incorporate aviation in the National Guard system.

A commercial aviation enterprise has been launched, and four machines have been ordered to start with. Spokane boasts a magnificent aviation field in Parkwater, on the outskirts of the city, where a two-way field of 500 acres offers landing grounds said to be unsurpassed in the United States. The Flyers' Club and the commercial enterprise will locate their hangars at Parkwater. The club hangar will include a practical work-shop where members will have an opportunity to test the ideas they have evolved as to improvements on present models. Several Spokane aviators have important innovations they are anxious to test out in practise.

Spokane is especially favored climatically for aviation. Fog is almost unknown, and the clarity of the air all the year round has been emphasized by experts in the moving picture trade.

This city is strongly recommended as a center for aeroplane body building. The choicest spruce is available in immense quantities, electrical power is plentiful and low in cost, and the city is exceptionally free from labor troubles, while the cost of living is comparatively very low. Any legitimate enterprise will have the strongest endorsement and support of local aviators.



The News of the Week



Aircraft Entertain Spectators at N. Y. Police Tourney

Sheepshead Bay, N. Y.—A large number of army planes, headed by a huge Handley-Paige bomber, participated in the events at the field days of the New York Police Force. Commander John H. Towers and Lieut. Commander Patrick N. Bellinger were taken to the field in army aeroplanes. Exhibtions of formation flying were given.

C. F. Kettering Covers 800 Miles in Fast Time

Dayton, Ohio.—Maintaining an average speed of 103.3 miles an hour, in spite of a direct head wind, all the way east from St. Louis, Charles F. Kettering, inventor, returned home today from a convention at Wichita, Kan. The De Haviland machine, piloted by Howard Rinehart, landed at South Field, Dayton, on July 19th, at 3:15 P. M., having covered 800 miles in seven hours and forty-five minutes.

Dirigible R-33 to Fly to India

The British dirigible R-33, sister ship of the R-34, which completed a round trip transatlantic voyage on Sunday, is being groomed for a flight to India. It is expected to leave some time this week.

The trip will be made by way of France, Switzerland, Italy and Egypt. A landing will be made in Rome and probably in Cairo. The flight is expected to occupy fifteen or twenty days at three-quarters speed.

Missionaries to Buy Curtiss Flying Boat for Use in Africa

A flying boat or an aeroplane may soon form a part of the equipment of modern missions in blackest Africa, according to a letter received yesterday by the Curtiss Aeroplane and Motor Corporation.

The letter was from the Congo Mission of the Disciples of Christ, the headquarters of which is at Coquilhatville, Belgian Congo.

"We are interested in the matter of the purchase of flying boats to replace wholly or in part the fleet of launches which we have been planning for service in communication between our various stations," the letter stated. "We have a large river steamer for transportation between stations which hydroplanes might supply. Our area is about 500 miles east and west and 200 miles north and south in extent. The whole area is covered well by an extensive system of waterways. In inland points landings might be made in small machines in the straight, smooth, central streets of the native towns, which in this section are usually clear of grass and other obstructions and are not less than 100 feet wide."

What the untamed congregations will think of the innovation is a matter of conjecture only.

Memorial to McConnell Unveiled

A statue to Lieut. James Rodgers McConnell, an American aviator killed in France in 1917, was unveiled at the University of Virginia. The statue, which is based on the legend of Daedalus, the Greek, was executed by Gutzon Borghem, and represents his interpretation of the "Spirit of Aviation."

Championship Balloon Race to Start From St. Louis

A balloon race for the United States championship will start from St. Louis October 1. The race will be conducted by the Missouri Aeronautical Society under the rules of the International Aeronautical Federation.

The first prize will be $500, the second $300 and the third $200.

Raynham Ordered Home, Abandons Flight Plan

Captain Frederick P. Raynham, the British aviator whose Martinsyde biplane was wrecked twice in two months spent in trying to start a trans-Atlantice flight, has received orders to abandon further attempts and return to England. Raynham and his navigator, Conrad H. Biddlecomb, directed the crating of their plane, and both expect to leave with it on the steamer Grampian. Their mechanics will return to England with them.

Aeroplane to Revolutionize Professional Baseball

New York, N. Y.—Commenting on the flight of a former professional baseball player from Colombey-les-Belles to Treves to umpire a game between two teams of the Seventh Division, John J. McGraw, the manager of the New York National League Baseball Club, predicted that aerial transport would revolutionize professional baseball.

"It certainly will make the job of constructing schedules an easy one," said Mr. McGraw. "At the present time trains and distance have to be considered most carefully, and in forming a circuit certain towns are automatically eliminated because they are too far away. It looks as if some day a team might be able to leave New York early enough in the morning to play in Pittsburgh, Chicago, or even St. Louis that afternoon.

"San Francisco might be able to become a member of one of the major leagues. San Antonio might play in the Connecticut League or Hartford in the Texas League. Twenty years from now we might be able to form a League of Nations, with London, Paris and Rome as members."

Three-Motored Monoplane to Attempt Trans-Atlantic Flight

Los Angeles, Cal.—George D. White, aeronautical engineer and head of the George D. White Company of Los Angeles, recently announced that he proposes in the near future to attempt to cross the Pacific Ocean in a 660 horse-power triple motored monoplane which he is now planning to build.

Relative to his route across the Pacific Mr. White said he had considered this from many angles and is convinced that a northern route by way of Alaska and Kamchatka would be the better under present conditions. With his machine Mr. White proposes to cover 7,000 miles, jumping off from Los Angeles, touching at San Francisco, Victoria, British Columbia, Sitka, Unalaska, Petro Pavlosk, Yokohama, and finally Shanghai, the end of the flight.

The northern route, it is estimated, will take three days, according to the plans from Los Angeles to Japan, a trip now requiring three weeks on the fastest boat.

Mr. White points out that it will be an independent flight and that his effort to be the first across the Pacific Ocean will not be so much an attempt to win the $50,000 prize offered by Thomas H. Ince as it will be to prove the reliability of the White monoplane.

To Build Dirigible at Philadelphia Yard

Philadelphia.—A dirigible similar to the British R-34, to be built at the navy yard here, will attempt within a year a flight to Europe, Commander Coburn, in charge of aircraft production for the navy at this



An experimental biplane constructed by the Farman Company. Note the method of mounting the two radial motors and the propeller shafting

point, announced. He also made public plans of the department to establish a landing field at Lakehurst, N. J., with hangars capable of housing balloons larger than any yet built.

Ships to Aid Flyers

Vessels will give longitude and latitude to trans-Atlantic flyers whenever occasion arises, if suggestions made by the National Advisory Committee for Aeronautics of the U. S. Shipping Board are carried out.

The Advisory Committee has recommended that all ships flying the American flag should be instructed to give all navigation assistance of this nature at all times in the future to trans-Atlantic flyers, and has asked the U. S. Shipping Board to convey the recommendations to all ocean-going vessels carrying the flag of the United States.

No Part in Aircraft Standards

As a result of action by Congress the plans for American participation in the International Aircraft Standards Commission Conference have been dropped. This conference, which was started during the war when delegates from all of the allied countries met in London and conferred on problems of aircraft standardization, is to be permanent, with a central office in London.

The provision for American participation was included in the army appropriation bill appropriating $1,000 toward the maintenance of the office and $50,000 for the expenses of delegates. As a result of the refusal of the House to agree to the provision as incorporated in the Senate army appropriation bill, this section of the bill was eliminated and participation of America in Standards Conferences ended.

An attempt will be made next year to secure appropriations for participation of American delegates for 1921.

Seventeen Fliers Entered in Toronto-New York Race

Seventeen entries and $10,000 in cash prizes and trophies are already assured for the aeroplane flights from here to New York which are to feature the Canadian National Exposition to be opened by the Prince of Wales on August 25, at Toronto.

So far all entries for the Toronto-New York race are from the United States, but twelve Canadian entries are expected before the exposition opens. Captured German Fokker planes, now in the possession of the Dominion Government, will be admitted to the contests it has been decided, provided their pilots hail from allied countries. There are twenty-two of these craft here now.

Airmen Dive Under Suspension Bridge at Niagara

Niagara Falls, N. Y.—L. H. Holmes, pilot, and S. Bonnick, aerial photographer, starting from Lake Side Aerodrome on the Hamilton Highway on July 11th made an aerial photography trip in the Niagara Falls region, taking pictures of Oakville, Burlington, Hamilton and St. Catherines, en route. After a short stay at Merritton for gasoline the Falls were reached at 4.30. Shooting over the Canadian Falls and through the spray, a perilous ride commenced. With engine full open, the machine shot down at a terrific speed under the Suspension Bridge and when attempting to rise again the air current was so great that the machine had to be piloted under the next two bridges, continuing down the river, narrowly missing the wires suspending the Aerial Car.

At the whirl pool the machine was still below the top of the gorge and a vertical bank had to be made at the right-angle bend in the river, narrowly missing the cliffs, and it was not until nearly at Brock's Monument that the machine rose just above the cliffs and flew into safety. Whilst Mr. Holmes was engaged in piloting the machine through the dangerous route, Mr. Bonnick was taking snap shots. Both Holmes and Bonnick were instructors in the Royal Air Force in Canada.

Civilian Aviators May Obtain Meterological Information From Washington

Washington, D. C.—Civilian aviators contemplating long cross-country flights in any part of the United States may now wire the metereological officer of the information group of the Air Service to find out what sort of weather they are likely to encounter, according to an announcement made by the Director of Air Service. This action is one of the first which implies recognition of the great part aviation is to play in commerce of the future.

"To assist aviators as far as possible to make their cross-country flights under favorable climatic conditions, subject to errors of a weather forecaster and without assuming any responsibility for accuracy, the meterological officer of the information group, Air Service, United States Army, will from the weather map reports and in consultation with the officials of the United States Weather Bureau attempt to forecast weather for flying in any part of the United States for thirty hours in advance of noon each day for the aviator making a request and stating points of intended flight," the announcement says.

"The result of this experiment may determine the value of an aerial meteorological service and warrant its organization as the cross-country flying increases and aircraft become more generally used for the transportation of passengers, mail and merchandise. Aviators making a flight following the prediction of the meteorological officer are requested to advise him as soon as possible as to the accuracy of the report."

Seaplane to Carry Manifests to Liners

A flying boat will carry mail to the trans-Atlantic liners when they are hours out of port, it was announced July 18 by the Post Office Department. The experiment in sea-aero mail service was decided upon by Otto Praeger, Second Assistant Postmaster General, after conference with David Lindsay of the International Mercantile Marine Company, which operates the White Star Line.

The first experiment will take place on August 9, when the Adriatic leaves New York on one of her regular trips. A mail pouch will be dropped on her deck several hours after she leaves her pier. The plan has been tried successfully by the United States Army and Navy in meeting troopships, but no commercial or postal service was ever used. The aero-marine service will save the ship many hours in getting away, for the necessary customs and tariff papers can be delivered by airplane to the ship at sea by the new method. It has not been decided yet whether a parachute will be atttached to the pouch.

Postmaster Patten says shipping companies regard the plan with considerable interest. Ships usually load until the last minute and then a manifest has to be prepared and filed with the Custom House as to what the vessel contains. The ship also has to have a copy of the manifest in order to dock at a European port. The time in copying and filing the manifest will be saved by the air service.

Mr. Praeger will be present when the first aero-marine flying boat takes off the Adriatic's papers and other special aeroplane trans-Atlantic mail.

Aeroplane to Be Used on Antarctic Trip

Two British aeroplane manufacturers have offered to give an aeroplane to J. L. Cope, leader of the British Imperial Antarctic Expedition, for a flight to the South Pole. It is declared to be Mr. Cope's intent to carry an aeroplane on board the exploring steamer Terra Nova, on which the expedition is to proceed until the vessel becomes fast from the ice.



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The Crown Prince of Roumania and Sir Henry and Lady Mainwaring visiting the Handley Page factory. They are examining a land and sea plane

Night Flight to Atlantic City

A Curtiss Sea Gull flying boat recently made the first night stop between New York and Atlantic City.

When the mechanics finished setting up the boat—it was almost eight o'clock, but, in order to get it to Earle L. Ovington, manager of the Curtiss Flying Station at Atlantic City, on time, Orton W. Hoover, one of the Curtiss pilots, left Port Washington hangars at 8.15. He started by moonlight against a heavy head wind, which made it necessary for him to land near Beach Haven for fuel.

Steering by means of a beach-fire, Pilot Hoover landed the boat safely upon the sand and, after procuring gasolene, he again made a take-off with the assistance of bathers, headed the Sea Gull out to sea, took the air and made Atlantic City at 11 o'clock.

The Sea Gull is the new three-passenger flying boat equipped with the Curtiss 150 horse-power motor.

Hoover, who is one of the most experienced pilots in the United States, took along as passengers Mr. and Mrs. C. R. Keys, of the Curtiss Engineering Corporation.

Admiral Kerr Discusses Flight

Admiral Mark Kerr, who was in charge of the Handley Page Atlantic flight expedition, accompanied by Mr. W. H. Workman, arrived at the Hotel Biltmore on July 15 from Parrsboro, Nova Scotia.

This is the second visit of the Admiral to this country, having been here in 1905, when he was in command of the H. M. S. Drake, of the second Cruiser Squadron of the British Navy, which visited these shores at that time, and was under command of the Prince Louis of Battenberg.

Admiral Kerr is the oldest aviator in the world, being 55 years of age, and he hopes to be flying when he is 70 to celebrate the twenty-first anniversary of the securing of his pilot certificate, which was issued to him six years ago, making him one of the pioneer aviators of Great Britain.

The Handley Page abandoned the Atlantic flight project in favor of a flight from Harbour Grace, Newfoundland, to Atlantic City on July 4th. An oil pipe breaking in one of the four engines caused a forced landing and they came down at Parrsboro, Nova Scotia, on a race course, and after making a perfect landing, came in contact with a concealed ditch which caused the machine to turn over on its nose just about the time the machine came to a standstill, which has made it necessary to repair the machine before it can resume its flight into America or on through Canada. When Admiral Kerr was asked about the flight he gave the following details:

"The flight to Parrsboro demonstrated several things, namely, the necessity for large aeroplanes, the necessity for multipled engine aeroplanes, the reliability of a machine equipped with several engines and the safety connected therewith.

"We left Harbour Grace at 6 P. M. on July 4th with a load of 29,000 pounds, the largest load ever carried by any type of aeroplane, which included the crew, consisting of Major Brackley, Major Gran, Mr. Wyatt, Engine Mechanic Arnold and Aeroplane Mechanic Elements. The machine was fitted with Marconi's directional wireless as well as a transmitting and receiving instrument. All of this equipment worked admirably. The course was laid for Sydney, which we passed at 10.15 P. M. The average speed being 83 miles per hour with an adverse wind against us. At 9 o'clock the crew had dinner in the cabin while the pilot at the wheel had his dinner brought to him, after which the off duty pilot had a few hours' sleep. At 11.30 I was piloting the machine and noticed that the starboard foremost engine was dropping revolutions and with the throttle wide open could only maintain 1,600 revolutions, and it was evident that something was wrong. Major Gran and Mechanic Arnold climbed out to the engine, but beyond finding a quantity of oil, they could not in the darkness ascertain the trouble. This feat on the part of Gran and Arnold was a very daring one and they deserve much credit for it. The engine continued to run at 1,600 revolutions until 2.05 A. M. in the morning, when one piston rod gave out and the cam rod broke, the engine cover passed through the fuselage together with several pieces of metal. The other three engines now had to do all the work and the throttles were open and the revolutions went up to 1,800 to 1,820. 'If they stick it out it will be the finest advertisement the Rolls Royce have ever had,' said one pilot to the other, and they did not only stick it out, but did so without a waver on the needles of the indicators, and as if they were only running on half a throttle and not full out all the time. It is safe to say that there is not another aeroplane engine in the world which could have gone through such a strain and test.

"These three engines kept the machine in the air with the weight of 26,000 pounds running practically for the whole time of three hours and fifty-five minutes until the landing at Parrsboro at 5.50 A. M., being in the air ten minutes short of twelve hours.

"The race course which we sighted from the air and about which we knew nothing, appeared to be a proper place to land as well as a safe place, and had it not been for the concealed ditch, a new engine could have been installed and the machine continue on its journey.

"In spite of the accident to the oil pipe terminating the voyage, there are some excellent lessons to be learned from this trip, and much encouragement for the development of commercial flying.

"First—It proves the value of multiple engine machines.

"Second—It shows what a Rolls Royce engine and a thoroughly well built aeroplane as the Handley Page can accomplish in the face of an accident, when thirteen tons are kept in the air for nearly four hours on three engines and might have kept up as long as there was gasoline to give the engines.

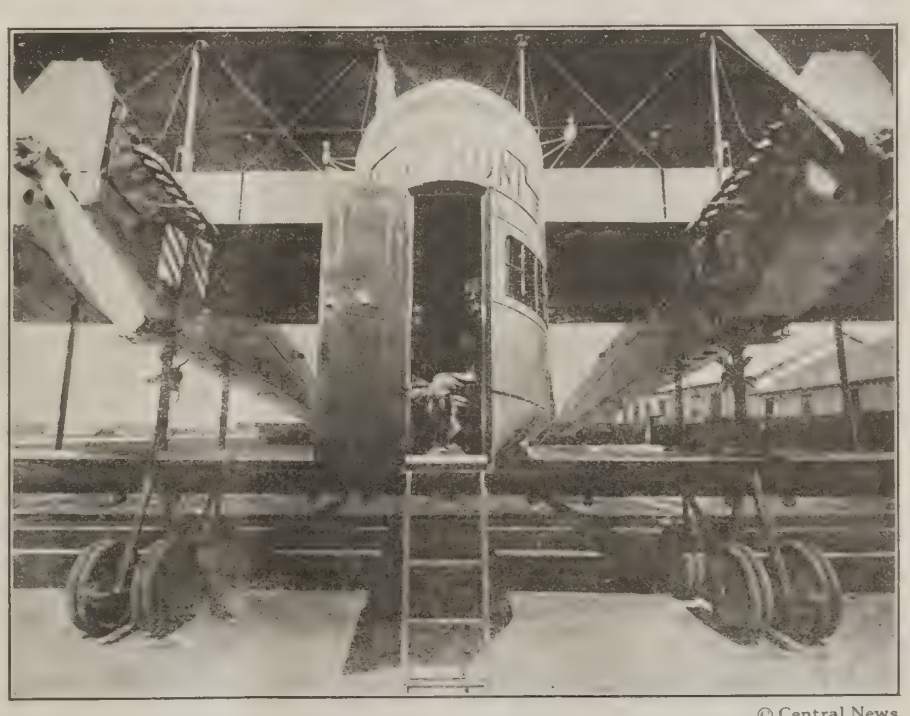
"Third—That wireless and directional wireless are of the greatest use in a machine large enough to carry them.

"Fourth—That comfort and sleep can be obtained in a Handley Page during a long flight.

"Fifth—In addition it is well to remember that in all the trans-Atlantic attempts, as well as this flight of twelve hours by a trans-Atlantic machine, not a single life has been lost or a bone broken. Given a good machine, good engines, good pilots, the risk in flying is very small. Neither is flying confined to any special age. I have been flying for over seven years and have been a pilot for five years and I will be 55 years old in September. One of the other pilots is close to 30 and the other under 25 years of age.

"I consider that there is a great future for commercial flying in America. The land of great distances, great trade and speed in and with which, if the aeroplane is used intelligently, will prove an enormous boom and an able assistance to commerce and travel over long distances and most especially in this, your wonderful country of America. Its capabilities are enormous and its future assured as long as its promoters remember two things—first its limitations and, second, reliability before all things."

Admiral Kerr is remaining in New York for a few days, after which he will return to Parrsboro to assist in repairing the machine, and he hopes to be able to fly it to Atlantic City in the very near future.



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The car and landing gear of a Caproni passenger-carrying triplane

The AIRCRAFT TRADE REVIEW

Rolls Royce Director Arrives in U. S.

New York.—Claude Johnson, managing director of Rolls-Royce, Ltd., arrived in the United States recently from London for a conference with American representatives of the famous British motor corporation. He was not at liberty, he said, to discuss the company's American affairs.

Test Gasolene Substitute

Fifty automobiles climbed the steep Dock street hill in Yonkers after their tanks had been emptied of gasolene and filled with a substitute for it devised by Dr. Louis Clement. The demonstration was under the direction of the Society for the Advancement of American Inventors, Inc.

The principal ingredients of the substitute, which is known as "nuoline," are kerosene, naphtha and water. It can be made in 20 minutes and some of it was manufactured yesterday just before the test started.

Aaron A. Feinberg, former State Senator and Dr. Clement's attorney, said it could be produced for 9½ cents a gallon and retailed for 18 cents. He declared that a gallon would drive a heavy machine eleven and a half miles, that it was non-explosive and would not carbonize. Several aeroplane manufacturers were present when the tests were made.

Goodrich Co. Enlarging Factory

Akron, Ohio.—A new building which will be the largest of the 84 in use by the B. F. Goodrich Co., will soon be under construction. It will be 170 x 300 feet, eight stories high. The warehouse will be built next to railroad siding and will have an unloading platform and seven special elevators.

Brolt Aircraft 275 Watt Dynamo Weighs 19 Pounds

In order to fill Admiralty requirements for extra light-weight dynamo sets for a special branch of the Air Services necessitating the full output for long periods or indefinitely if necessary, a new type of self-regulating dynamo accordingly was designed by Mr. Holt, technical director of Brolt, Ltd., of Birmingham, England. This design incorporates a scheme of forced ventilation whereby cold air was continuously blown through the interior of the machine, enabling an output of 275 watts to be obtained continuously at quite a moderatee speed, from a dynamo weighing under 19 pounds. For airship equipment, electrical apparatus has been designed and manufactured which has elicited eulogies from the authorities concerned.

Personal Pars

David Linton Ingalls, of Cleveland, O., has been re-elected captain of the Yale Hockey team next year. He was the only American ace in the U. S. Naval Aviation Service.

Tail Structure of NC Flying Boats Supported by Hollow Spars

Lieutenant Commander W. Starling Burgess, being a thorough yachtsman and well acquainted with the great advantages of the hollow spar, conceived the idea that in the preliminary design of the NCs, the proper way to hold the tail structure would be by a hollow wooden spar.

The Pigeon Hollow Spar Company is the original builder of hollow and laminated wing beams, struts, etc., and first to advocate to the United States Government the great advantages and practicability of hollow and laminated parts.

Lieutenant Commander Burgess' idea was followed by a conference at Washington, and later by an order for hollow-tail booms for experimental purposes. These booms were made and were sent to the Bureau of Standards and tested.

The Pigeon Hollow Spar Company had several talks with Lieutenant Commander Burgess as to the strength required by these tail booms, and it was ascertained that they must carry a loading strain of approximately 3,500 pounds. There were two sizes of booms made, approximately 18′ long, 6¼″ in the center, tapering to 3-⅛″ on the ends, and 5¼″ tapering to 2¾″ on the ends. These spars were constructed in four pieces, glued together with Pigeon glue. The tests were made at the Bureau of Standards, and a report was issued, which is as follows:

Column Tests of Pigeon Hollow Spars

Approx. Length	Diameter ″ Middle	Ends	Weight lb.	Prop. limit lb. Comp.	Deff.	Ultimate strength lb.	Slope of comp. curve in lb.
(1) 17′ 9″	6.25	3.15	25.0	9,000	5,600	15,900	11,050,000
(2) 17′ 9″	6.27	3.25	24.75	9,300	7,100	17,600	10,840,000
(3) 17′ 8″	5.35	2.67	18.5	5,000	2,500	9,030	8,060,000
(4) 17′ 8″	5.37	2.72	19.0	5,600	2,800	10,300	8,410,000

Tns. Lab. No. 0213b18
February 21, 1918.

CHARACTER OF FAILURE

(1) Failed by buckling down at 1/3 point. Column split into five parts at point of failure. Partial compression failure near ends.
(2) Compression failure next to web about 5 ft. .07 in. from end.
(3) Failed by bending. Load dropped to 4,000 lb. and remained there until fracture occurred by crushing over a diaphragm about 4′ from end of spar.
(4) Failed by bending.

Much attention was attracted by the remarkable crushing strain withstood by these tail booms and by the manner in which they split. Not one of the breaks came in the glue joints.

After very successful tests an order was placed through the Curtiss Company for four sets of tail booms for the NC-1, NC-2, NC-3 and NC-4. When the booms were received by the Curtiss Company they were found to be so light for their length that there was much speculation as to their being strong enough for the work required. Another test was made at Washington, and it was found that they stood up to better advantage than the sample set previously submitted, and in no instance did they break where it was thought they would. This was accounted for by the fact that the sample booms had diaphragms every two feet, and the latter booms did not.

The hollow spar was made of practical use of again in connection with the flying boats of the Navy Department. With the original wireless equipment on these boats, wireless messages could be transmitted but a short distance, but with the assistance of hollow telescopic masts which could be raised to a height of 33′, this difficulty was overcome. These telescopic masts were made in four sections which telescoped from one to the other, so that the mast had a height when housed of only ten feet, with a gross weight of only 12 pounds. The first sets were manufactured by the Pigeon Hollow Spar Company.

Both hollow spar and laminated structure have been acknowledged to be the proper methods in building aircraft. This method works to a great advantage by a great saving in weight, and at the same time it adds strength to the structure. By this construction stock is utilized in different lengths which would otherwise be wasted.

The Pigeon Hollow Spar Company has been building flying machines and flying machine parts since the year 1910. On the first monoplane which they constructed in 1910 every strut, longeron, wing beam, etc., was hollow.

The advantages of the hollow spar are acknowledged likewise for all sailing and steam yachts. An experimental set of hollow spars for one of the latest destroyers brought about a saving in weight over the old solid construction of 60 per cent. Practically all the yachts, both English and American, which race for the America's cup, have been equipped with the Pigeon hollow spars.

Personal Pars

A. E. Aurand, formerly designing engineer for the Zenith Carbureter Corp., has been appointed chief engineer of the Claudel Carbureter Co.

Guy W. Yaugham, formerly in charge of production for the Wright-Martin Aircraft Corp., New Brunswick, N. J., has been appointed vice-president and general manager of the Van Blerck Motor Co., Monroe, Mich.

George N. Duffy has resigned as general superintendent of the Canadian Aeroplanes, Ltd., Toronto, to accept a position with the Canadian Cartridge Co., Hamilton, Ont., Can.

Edward A. Sipp, who has been serving as aeronautical mechanical engineer in the production engineering department, Bureau of Aircraft Production, Washington, has left the Government service and is now connected with the Dayton Fan & Motor Co., Dayton, Ohio.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative

PILOTS

Dana C. DeHart
Edward V. Gardner
Eber H. Lee
John M. Miller
Leon D. Smith
Max Miller
Charles E. Bradley
Lester F. Bishop
Harold T. Lewis
Leslie E. Stancill
Charles Hugh Anglin
John H. Skoning
Earl F. White
Charles W. Lamborn
Frank H. Crozier
Walter H. Stevens

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

Aerial Mail Postage Reduced to Two Cents

By an order of the Postmaster General today fixing the rate of postage on mail carried by aeroplanes at 2 cents an ounce, which is the regular postage rate for first-class matter, the Air Mail Service was placed on the same footing with all other means of transportation of the mail.

The experiments during the year which have been devoted to the adaptation of the aeroplane to the needs of the regular daily mail service, have demonstrated possibilities for increased efficiency for mail transportation beyond the early expectations of the Department. Since the conclusion of the war, by the use of the Liberty engine and the availability of larger planes salvaged from war stock, mail in greater quantities can be carried as well as greater speed made by reason of the more powerful Liberty motor. Thus, approximately more than 10,000 letters a day for Seattle, San Francisco and Los Angeles and other points on the Pacific coast which fail to connect with the westbound 8:40 p. m. train out of New York are now being advanced 24 hours daily to their points of destination.

In the same way mail from New York that did not catch the 5:15 p. m. train for the West is now being delivered in Chicago in the afternoon instead of the following morning.

Arrangements are now being made to place on the New York-Washington route the three fastest aeroplanes in the Air Mail Service, each having a capacity of 18,000 letters and a maximum speed in calm weather of 132 miles an hour.

The department in anouncing this important change in the Air Mail Service makes the following statement:

"The sucessful operation of the Air Mail for more than one year and the great development for commercial work in the aeroplane in that period, has taken this phase of mail transportation entirely out of the class of experimental work. The great saving of time now effected over the fastest railroad train between New York and Chicago will enable the department to make a saving in car space of more than twice the cost of the operation of an air mail service on that route. It will, therefore, no longer be necessary to charge more than the regular rate of postage for the transmission of aeroplane mail.

"The success of the airship in carrying the mail, together with the great development that has taken place in speed, in quantity of mail that can be carried and certainty of operation, makes it improbable that the air transportation of mail, whether by the Government or commercial air transportation lines will ever be stopped, but will increase from year to year by leaps and bounds, especially over long distances. The great expedition of mail by this means of transportation constitutes a service which the public throughout the country is now demanding, and in course of time will receive, as supplementing the train service.

"For these reasons the air mail has been placed on the same basis with all other means of transportation and the rate of postage made the same as over all other means of mail transit."



G. L. Conner, Chief Clerk of the Aerial Mail Service, is in charge of administrative work

G. L. Conner Has Long Postal Administration Experience

Mr. G. L. Conner, chief clerk of the Aerial Mail Service, has had long experience in postal administration. Mr. Conner has been connected successively with the railway mail, motor vehicle and aerial mail branches of the Postal Service. Prior to this he served three of America's leading railway companies over a ten-year period in connection with the transportation service.

Britain Planning to Send Mails By Air

An aerial mail service to foreign countries is being seriously considered by Great Britain, the Assistant Postmaster announced in the House of Commons July 18.

It might not be long, he said, before mails would be carried to Australia, China and elsewhere in a comparatively few hours, revolutionizing mail transportation.

Colombia Plans Aerial Mails

Colombia plans to institute an aerial mail service over three routes—one between Bogota, the capital, and Barranquilla; the second between Bogota and Pasto and the third between Bogota and Curuta.

Dr. Carlos Adolfo Urueta, the Colombian Minister in the United States, has been advised that bids for carrying the mails will be opened November 20.

Fiat BR Biplane Used in Speed and Altitude Record Flights

The improved Fiat BR biplane with a horizontal speed of 163 miles an hour, was used in establishing the world's three-passenger altitude record of 23,786 feet in 24 minutes.

The pilot of the Fiat BR in both its speed and altitude records was Mr. Brack-Papa, one of the most experienced of Italian aviators. It is the intention of Mr. Brack-Papa to fly the Atlantic on a special fast machine built on the same general lines as the Fiat BR. This machine will have a speed of more than 150 miles an hour.

This BR Fiat machine was designed just before the close of the war to be used as a high-speed long-range bomber. It is equipped with a 700 h.p. 12-cylinder Fiat engine, which is the highest powered engine employed for air work. This machine is a biplane having a wing span of 51 feet 9 inches. The depth of the wings is 7 feet 9 inches, and the length of the machine 32 feet. The aeroplane has a single fuselage carrying a Fiat 12-cylinder 700 h.p. engine driving a tractor screw with a diameter of 11 feet 3 inches. The exhaust pipes which project from each side of the fuselage are encased with sheet metal so as to form a supplementary bearing surface. The struts and the wires are all streamlined. The weight of the machine empty is 2¼ tons and its useful load 1½ tons. Its climbing speed is 1000 metres (3280 ft.) in 3 min. 45 sec.; 2000 metres (6560 ft.) in 7 min. 30 sec.; 3000 metres (9842 ft.) in 12 min. 30 sec.; 4000 metres (13,123 ft.) in 18 min. 16 sec., and 5000 metres (16,400 ft.) in 27 min. In unofficial tests the climbing speed was increased to 13,123 feet in 16 minutes.

AMERICAN COMMERCIAL, TOURIST AND PLEASURE AEROPLANES

AEROPLANE manufacturers in America are turning out aeroplanes especially designed for various commercial uses to which they are to be applied. From the small single-seater sport plane, these recently designed machines range in size up to the 26 passenger-carrying tourist aero bus. They are all of American design and except in two instances, where Le Rhone and Anzani engines are used, the machines are provided with American engines.

Among the ten machines illustrated on the opposite page there are four single-seater sport biplanes, one two-seater flying boat, and a three-seater flying boat, one tandem two-seater, one side-by-side two-seater, one three-seater with two passengers side-by-side, and the 26 passenger tourist biplane. This means that out of ten designs there are but four of similar type. The characteristics sought for in designing these machines have made it necessary for designers to strike off on original lines and it is not to be wondered at that designs so radical have been put forth to meet these needs of civilian aviation.

The commercial uses of these aeroplanes which are now being developed and in many cases already in use, include the following: aerial mapping and photography, express and mail delivery, passenger-carrying, aerial touring, fire and police patrol, advertising, exploring, reconnaissance, news distribution, and exhibitions.

A brief outline of each of the machines shown in the accompanying illustration will serve as a means of comparison:

Aircraft Engineering Corporation "Ace"

The "Ace" is a single-seater sport plane which has put up some very good performances at Central Park, L. I. The machine readily answers the controls and is especially suited for sport flying, light express or mail delivery, advertising and exhibitions.

The most noticeable features of its design are the *I* shape interplane struts and the central skid of the undercarriage. The struts make it easy to line the machine up for there are no incidence cables to adjust. A great deal of hard usage has proven the value of the central skid. In taxying on the ground this skid prevents nosing over, eliminating the ever present danger of damage from overturning. In landing, the heel of the skid acts as a brake bringing the machine to rest after a very short run on the ground. This feature makes the machine suitable for small fields.

The upper plane has a span of 28′-4″ and the lower plane a span of 22′-10″. Chord of both planes 5′; gap between planes 5′-6″. Machine is 16′ long and 7′-6″ high. With a pilot weighing 135 pounds, the machine complete weighs about 650 pounds. In a test flight a sand load of 185 pounds was carried. The "Ace" climbs to 6,000 feet in 20 minutes, and to 8,000 feet in 27 minutes.

A vertical four-cylinder, water-cooler, "Ace" engine is used. This engine delivers 40 H.P. at less than 2,000 R.P.M. The high speed of the machine is about 60 M.P.H. and the landing speed 35 M.P.H.

The Packard Two-seater

In the Packard aeroplane the pilot and passenger sit in tandem. The machine was especially designed for cross country trips but it is of a type suitable for delivery of express and news, reconnaissance, fire patrol, and as an auxiliary for police protection. The machine weighs 1,520 pounds empty and the complete flying weight is 2,167 pounds. The weight per horsepower is 13.5 pounds, and the wing loading 5.6 per square foot.

At ground level the speed is 102 M.P.H., the range for fuel at this altitude being 2½ hours. At 5,000 feet the speed is 100 M.P.H.; this altitude is reached in 7½ minutes and the machine can stay aloft for three hours. The machine has an absolute ceiling of 19,500 feet. A Packard 8-cylinder, 160 H.P. engine is used. Weight complete, 585 pounds.

The Curtiss "Seagull" Flying Boat

The Curtiss "Seagull," formerly known as the "M-F," is suitable for the sportsman and for passenger-carrying at lake and seaside resorts. As an exhibition attraction the flying boat always plays a spectacular role. The passengers are seated side-by-side with dual control. The cockpit is finely upholstered and comfortably arranged.

Span of upper plane, 49′-9″; span of lower plane, 28′-10″; overall height, 11′-9″.

Weight empty, 1,796 pounds; useful load 636 pounds. The speed range is from 45 to 69 M.P.H., and an altitude of 5,000 feet is reached in 27 minutes. The maximum endurance is 325 miles. A Curtiss OXX 100 H.P. engine is used.

The Loughead Sport Plane

Low cost for operation is one of the features of the Loughead Sport Plane. At full speed the fuel consumed by the Loughead 24 H.P. engine is one gallon an hour, which, at a speed of 50 M.P.H. means 50 miles to the gallon; an expense of about 1 cent a mile. The Loughead is a single-seater and weighs but 500 pounds fully loaded. Of this weight 200 pounds represents the useful load which can be carried.

The upper wing has a span of 28 feet; lower wing 24 feet; overall length 19 feet. Fully loaded the high speed is 65 M.P.H., but the landing speed is only 28 miles an hour. The absolute ceiling is 16,000 feet. The flight range is 450 miles.

Control is maintained in an unusual manner, there being no ailerons for the lateral movements of the machine; instead of ailerons, the lower wing sections are arranged to pivot about their axes, accomplishing the desired manœuver.

The machine should find a good place in exhibition work, or advertising, as well as in the sporting purpose for which it was primarily designed.

The Dayton-Wright "Messenger"

Veneer is used to a great extent in the bracing of the fuselage in the Dayton-Wright "Messenger" biplane. It is probably the smallest commercial aeroplane flown in this country. Both planes have a span of 19′-3″ and a chord of 3′-4″. Overall length 17′-6″ and height 6′-1″. Unloaded, the machine weighs 476 pounds; loaded it weighs 636 pounds. The horizontal maximum speed is 85 M.P.H. and the landing speed is 37 M.P.H. In 10 minutes machine will climb to an altitude of 10,000 feet.

An air-cooled De Palma, 37 H.P. engine is used. This is a four-cylinder, "V" type, weight 3.7 pounds per horsepower. Four gallons of gasoline are consumed per hour and the machine has a tank capacity of 12 gallons.

Curtiss "Oriole" Three-seater

The three-seater Curtiss "Oriole" has been made, its designers claim, "for the man of affairs and for his family." Every comfort is provided for the two passengers who sit side-by-side in the forward cockpit which is reached by means of a door in the side of the machine. There are no controls in the forward cockpit and every consideration is given to the convenience and safety of the occupants.

The machine travels at 85 M.P.H. Its span is 36 feet, which is smaller than the average two-seater training plane. Fully loaded the machine weighs 2,188 pounds. The engine is a 90 H.P. Curtiss OX. The "Oriole" answers admirably the requirements of peace time flying combining comfort and safety, with economy, and beauty.

Span of both planes 36′; length overall, 25′; height overall, 9′5″; chord, 5′; useful load, 767 pounds.

The performances with a full load are as follows: high speed at sea level, 85 M.P.H.; at 5,000 feet, 83 M.P.H.; at 10,000 feet, 80 M.P.H. Low speed at sea level, 47.3 M.P.H.; at 5,000 feet, 51.6 M.P.H.; at 10,000 feet, 56 M.P.H. At sea level the economic speed is 60 M.P.H.; at 5,000 feet, 65.5 M.P.H.; at 10,000 feet, 71 M.P.H. Fully loaded the machine climbs to slightly less than 2,500 feet in 10 minutes. The rate of climb is 400 feet per minute.

Endurance at high speed, 4.3 hours, sufficient for a flight of 365 miles. Endurance at economic speed, 6.65 hours, in which time a distance of 393 miles can be traveled.

Aeromarine "T-50" Flying Boat

The Aeromarine Model T-50 Flying Boat is known as the "limousine of the air." It is a three-seater boat with an open compartment for the pilot and an enclosed cabin for the two passengers seated side-by-side behind the pilot. The covering of the cabin is with celluloid; the frame is hinged at the middle, so it may be opened from either side. Steps are pro-

(*Continued on page* 943)



AMERICAN COMMERCE AND SPORT PLANES



THE BRISTOL PASSENGER TRIPLANE

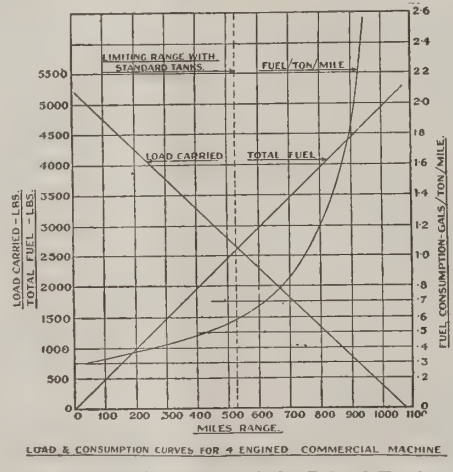
FOR commercial purposes, whether for the carriage of passengers or of freight, a special body has been designed and constructed for the "Bristol" Triplane. The passenger car described as the Pullman, is wholly enclosed, whilst the seats are placed on either side of a central gangway. There is ample head room as the Pullman is some seven feet in height, and for each passenger ladge Triplex glass windows are provided. There are also elaborate arrangements for electric lighting and heating. The seats are so arranged as to be easily removable and the space thus rendered available can be utilized for the stowage of luggage and general cargo. The storage room thus available for cargo is 320 cubic feet.

The performances of this model in respect of speed, climb, range and weight carried are approximately the same as for the Bomber riplane. Bearing in mind that the useful weight carried is in inverse ratio to the quantity of fuel carried and the consequent range of flight, it will be seen that, in addition to the two pilots, the machine is capable of lifting a load of 2,700 lbs. together with fuel for a five hours' flight, or, alternatively 4,000 lbs. with fuel for 7½ hours' flight. These figures are based on an economical speed of from 100 to 105 miles per hour, that is to say at three-quarters throttle, leaving a sufficient reserve of power in hand to reach 125 miles per hour if necessary.

In the accompanying graph, "load carried" is in addition to the weight of two pilots, oil and water, but includes gasolene. For oil consumption, divide gasolene consumption by 15.

The main specifications of the Pullman type triplane are as follows:

Wing Area (sq. ft.)		1,905
Wing Span	Top Plane	81′ 8″
	Center Plane	81′ 8″
	Bottom Plane	78′ 3″
Chord of Wing		8′ 6″
Overall Length		52′ 0″
Maximum Height		20′ 0″



Graph of performances of the Bristol Triplane Cargo Machine

Weight empty (lbs.)	11,000
Weight loaded (lbs.)	17,750

When, for the conveyance of mails or other cargo, any or all of the passengers' seats are removed, the following examples give an idea of the manner in which the accommodations may be arranged. These figures may be varied to suit requirements:

14 passengers and 280 lbs. of cargo
9 passengers and 1,180 lbs. of cargo
4 passengers and 2,080 lbs. of cargo
0 passengers and 2,800 lbs. of cargo

The above figures are based upon sufficient fuel being carried for a flight of 500 miles, but if the full quantity of fuel is not taken, the weight of cargo may be increased accordingly.

For commercial purposes it is not desirable that the machine should be flown at its full speed of 120 miles per hour, and a speed of 100 miles per hour (at three-quarter throttle) is recommended as being the most suitable in view of the economy of fuel effected.

Four 410 h.p. Liberty engines are fitted, and any two of these are sufficient to maintain the triplane in flight in case of breakdown of the others. A full set of flying instruments is also fitted, comprising: 2 air speed indicators, 4 revolution indicators, 1 switchbox for electric lighting, 1 watch, 1 compass, 4 oil pressure gauges, 4 radiator thermometers, 4 Liberty switches and voltmeters, 1 altimeter, 1 cross level, and electric lighting set for each instrument.

Personal Pars

Bruce Eytinge, sales-pilot, has had added to his duties those of advertising manager of the Aircraft Engineering Corporation, manufacturers of the "Ace" biplane.

Speaking of records, Captain Roy N. Francis, of the Army Air Service, now on duty in the office of the D. M. A., is believed to hold the record for number of hours in the air. Up to the present time this officer has more than 5,000 such hours to his credit.

Two new appointments have been made in the Information Group of the Department of Military Aeronautics. Major E. L. Jones has been assigned to the Dissemination Division and Major Melvin Hall to the Collection Division. Both these officers served with distinction overseas, Major Hall especially, since he has been on duty with the French, the British and the American forces and seen action from 1914 till the armistice, all along the line from Ypres to the Argonne.

Book Review

THE THUNDER BIRD, *by B. M. Bower.* The further aeronautic adventures of "Skyrider" Johnny Jewell. When "Skyrider" Johnny Jewell won his aeroplane and the love of Mary V. Selmer, he may have thought his troubles at an end. As a matter of fact that had really only just begun, for that cherished plane was to lure him into so many exciting adventures that between them and the demands of Mary V., poor Johnny found his life just one succession of mishaps. Read this interesting story and see where this book gets its title. Price $1.65, post paid.

SOME NOTES ON ENGINE RUNNING

SKILL in engine running is mainly a matter of experience, but a very great deal depends upon simple deduction and logical reasoning.

Every engine trouble is the result of one or more definite causes and as a rule is accompanied by symptoms from which the cause may be deduced. In any case a clue is obtained from the manner in which the engine fails. For example, a sudden stoppage, unaccompanied by the obvious symptoms of internal breakage or "seizing up," can only be due to complete failure of fuel supply, or ignition system, and in such a case it would be against the dictates of common sense to open up the engine, or even to inspect the spark plugs.

In the hands of a capable mechanic an engine in good condition should start with certainty and ease. When the engine is running, symptoms should be detected, and recognized, before any trouble fully develops, and in case of failure resulting from the more common causes, the fault should be located immediately, or at the most, after a brief inspection of the engine.

Starting Up

Before starting an engine, turn it over once or twice, note that the valves are not sticking, and that the compression is normal. See that there is a sufficient supply of gasoline and oil for the run, and that the oil is of the right quality and consistency. In winter it may be necessary to warm up the oil, or, in the case of castor oil, to thin it down with methylated spirit, which may be added in a proportion not exceeding half a pint to the gallon. In water cooled engines see that the water circulating system is in order, and contains the proper quantity of water. It is usual to allow about 2% for expansion of water when hot.

When an engine has been standing, its cylinders will be filled with air or inert gas, and, in order to start up, this must be replaced by an explosive charge. In stationary engines this is done by turning the engine, with air intakes closed, and gasoline on, when a rich mixture will be drawn into the cylinders, and the inert gas expelled. In rotary engines this method alone is not practicable, owing to the large volume of the crank case through which the mixture passes on its way to the cylinders. In engines of this class, therefore, it is usual before starting, to "dope" or "prime" the cylinders by injecting gasoline through the exhaust valves. Some stationary engines also are fitted with a priming pump, which sprays gasoline into the induction pipes, and so facilitates starting up.

Existing engines are started up by one or the other of the following methods:

(1) Propeller swinging (rotary and low-powered stationary engines)
(2) Hand-driven starting magneto
(3) Mechanical hand starting gear
(4) A combination of (2) and (3)
(5) Compressed air.

Propeller Swinging

The usual procedure is as follows:

The mechanic before approaching the propeller, calls out "Switch off. Gas on. Air closed."

The pilot turns the switch knob downwards, turns on the gasoline, adjusts the throttle, closed the extra air intakes, and repeats the words of the mechanic.

The mechanic, then gripping the propeller by each blade in turn, pulls the engine over, in its normal running direction, until the cylinders are charged. He then stands clear and calls out "contact."

The pilot turns the switch knob upwards and calls out "contact."

The mechanic then grips the propeller blade and making sure that he has a sound footing, pulls the engine sharply over compression and stands clear.

Hand Driven Starting Magneto

The procedure is as above but after the word "contact" the mechanic remains standing clear while the pilot starts the engine by vigorously cranking the starting magneto. (The starting magneto should not be left "on" when the engine is running.)

Mechanical Hand Starting Gear

The cylinders are charged by turning the engine with the hand gear. While the engine is being turned over as fast as possible by this means, the switch is put "on" and the starting handle is thrown out of gear.

Mechanical Hand Starting Gear with Starting Magneto

In this case the starting magneto is usually geared to the starting handle and is switched "on" when the cylinders have been charged as above.

Compressed Air

Air under high pressure is supplied to a small starting motor or directly to each of the engine cylinders in turn through a distributing valve driven by the camshaft. The air cock is opened and the engine is driven by compressed air until the cylinders are charged when the switch is put "on" and the cock closed.

Failure to Start

This may be due to: (1) Initial impulse lacking in vigor. (2) Incorrect adjustment of throttle. (3) Incorrect mixture. (4) Engine out of order. To start an engine it must be swung over compression at a reasonable speed. A mechanic exhausted by unsuccessful attempts to start a stubborn engine will be unable to put sufficient energy into the swing and should make way for a "fresh" man or take a short rest while looking over the engine to make sure that everything is in order.

Most engines will start best with a particular adjustment of the throttle which should be carefully noted. Where the carbureter has a slow running adjustment it is usual to start with the throttle quite closed. In other cases the throttle is set partly open, usually about one-quarter to one-third but never fully open.

An explosive mixture contains approximately 18 volumes of air to one of gasoline vapor and if the gasoline vapor is present in a much greater or lesser proportion the mixture will be too strong or too weak and will explode with greatly reduced force or will not explode at all. The vaporization of gasoline is assisted by heat and when starting a cold engine (particularly in winter) the spirit will be only partially vaporized. This results in a weak mixture unless a considerable excess of gasoline is provided for by flooding the carbureters or "doping" the cylinders or induction pipes. In warm weather and especially when starting with the engine hot it is easy to get too strong a mixture into the cylinders. When an engine fails to start for this reason, it should be turned over in the anti-normal direction through two or more revolutions in order that the mixture may be weakened by the addition of air drawn in through the exhaust valves.

In looking over an engine that fails to start ascertain that the ignition system is in working order and that the plugs are clean, sound and correctly coupled to the distributor. See that there is no loss of compression through leaky valves, plugs, etc., and look for possible air leaks in the induction pipe joints. As a final measure the timing should be checked.

Table of Engine Running Faults

Symptom	Fault	Possible Causes, Remedies and Remarks
Missfiring, Regular	Plug or Connection faulty	Cracked insulation. Points sooted up, too far apart, burnt away or fused together. H.T. connection broken or short circuiting. (To locate fault run engine for a few minutes and find coolest cylinder. If in doubt change all plugs.) (*See below.*)
	Loss of compression in one cylinder	
Missfiring, Irregular	Exhaust valve sticking	Dirty or damaged valve stem or guide. (Clean stem or as a temporary measure moisten with paraffin or gasoline. Valve rocker stiff on pin. (Clean and lubricate or renew if necessary.)
	Carburation faulty	Mixture much too strong or weak. (If 1 or 2 cylinders only may be due to air leaks in induction pipe.)
	Magneto contact breaker sticking, making bad contack, or out of adjustment	(Clean contacts, ease moving parts and adjust.)
	Distributor faulty	Segments short circuited or partially insulated from brush. (Clean with gasoline.)

(*Continued on page* 946)

WOOD PROPELLER CONSTRUCTION

By PORTER E. STONE, M. E.

MUCH has been written about the design and theory of air screws made of wood, but very little has appeared about the construction and methods used to obtain the best results. Probably the one thing which designers and engineers forget, is that it takes time to make and thoroughly season a propeller during construction. When in production, it should require at least eight weeks as a minimum, from the time the lumber leaves the dry kiln until the club is ready to ship.

A great many people have the idea that propellers are a hard and difficult thing to make. After having handled about seven thousand, the writer considers it an easy manufacturing proposition. The principal thing to remember is to take plenty of time and be sure of every step. Specifications as furnished by the Bureau of Aircraft Production and Steam Engineering Department of the Navy, were not at all difficult to adhere to. The tolerances and balances were not exacting beyond ordinary manufacturing facilities. While the writer does not agree with all methods recommended, if they are accurately followed, it will be possible to produce good propellers in quantity.

The first fifty or so propellers which are manufactured of any design, ought to be watched with great care, as all designs and types have their own peculiar characteristics, i.e., changes in pitch, track, etc.

The object of this article is twofold, first to help the designer understand a few of the problems the builder has to confront; second, to give new ideas to propeller manufacturers. So let us follow the lumber for the club from the time it enters the yard until the propeller is shipped.

Lumber

Propellers can be made from any timber which has a uniform texture and a high tensile and sheering strength. In the United States, poplar, quarter-sawed white oak, birch, cherry, walnut and true mahogany from Florida, Central and South America, are included in this class. Poplar was found to be highly efficient on the Mexican Border, on account of the extremely dry climatic conditions. Quarter-sawed white oak makes a propeller which weighs the most, birch coming next, then walnut, cherry and mahogany. The streaks in cherry have been found not to be a serious defect. The great difficulty found in using mahogany is that there are small wind breaks which are very hard to see in the rough lumber. Spanish cedar and baywood are oftentimes mixed with mahogany, probably a small amount in a propeller would not injure its quality, provided the wood is of good texture.

Considerable discussion has been caused this last year by the fact that lumber mills have not taken enough care in sawing and cutting the log. That is to say, the man on the saw carriage was not careful to place the heart of the log parallel with the saw. This oftentimes resulted in a diagonal cut and, of course, made the lamination appear to have a diagonal grain, which was really true of the board itself. In quarter-sawed white oak, considerable bastard sawed lumber has been found.

Grading Lumber

When the lumber comes from the mill to the propeller manufacturer, considerable care should be taken in grading the quality of lumber. Care should also be taken to keep each car load of lumber together, and so marked that the kiln man can easily designate each car load lot. The mill man should be careful not to mix different season's cuttings, as old lumber should not be mixed with green timber. The yard man of the propeller manufacturer, when he finds these conditions existent, should bring them to the attention of the kiln man.

At this time the propeller designer should become familiar with the percentages of widths of the stock, as small deviations in lamination layout will save much lumber in the manufacture. That is to say, laminations sometimes work out so that they are wider at the ends than the hub. As it is impractical to glue onto a lamination at the ends, this may necessitate a large percentage of wide stock, in fact, one or two inches larger than the lamination at the hub. A small change in the design of the propeller, or the layout of the lamination would have caused a decided saving to the manufacturer, as wide widths are harder to secure than the narrower stock.

Thickness of Lumber

Lumber of half inch to one inch thickness gives the best results. Personally, the writer has found four-four rough stock to be the best, taken as a standard, dressed on both sides, and resulting in a thirteen-sixteenth thickness lamination. With this measurement as a standard, the designer could produce a lamination layout and make the propeller with that in mind.

Yard Piling

A great many yards are not piled in a scientific manner. There is not enough timber used, together with a heavy enough foundation to keep the piles from settling at one corner or at one end. This results in giving the boards, after a duration of sometime, a permanent set. Also, in some yards it will be found that the long boards are allowed to overhang considerably, which does not benefit the strength of the lumber. A neatly trimmed pile, with a firm foundation gives the best results. A great many yard tracks are not laid straight, or level, so that when the kiln trucks are piled in the yard, there is a twist in the truck; thus, when the kiln truck is placed in the kiln, which generally has a track in very good condition, the boards are steamed and dried with a certain amount of twist. In piling on the kiln truck, after considerable experimentation, the writer prefers twenty-four-inch spacing between cross sticks, and not in excess of thirty inches. The cross sticks themselves should be not less than one inch square, and care should be taken to place the sticks directly one above the other. Short boards should be blocked on the end, so that they will not get in wind from the steaming and drying process. If good care is taken in piling the trucks, it will save considerable time when the lamination gets to the joiner, as a good straight flat board is preferable to one which is sprung and in wind.

There are several methods of piling on the kiln trucks, such as chimney, staggered, and straight, any one of which are adapted to any type of kiln. However, each type of kiln will give better results with one than the other.

Kilns

There are three principal things to remember in all dry kilns. First, that hot air is lighter than cold air; second, that moist air is heavier than dry air; and third, the greatest quantity of air which can be moved equally throughout the kiln. Together with these, there must be a good humidity control, and last, an automatic temperature-regulating device. In starting a kiln, for the first time, it is best to take punk sticks to test the circulation throughout the kiln, seeing that approximately the same amount of draft is in equal heights of the kiln, as it is often found there are dead spots in the kiln, which naturally results in poor local drying. For propeller stock, any type of kiln will usually give fair results. While the time taken by the ordinary box kiln with natural circulation is slightly greater than the re-circulating types, if handled with a



Glued up propellers in block form

fair degree of care, and plenty of time taken, it will dry the lumber. The re-circulating type kilns, such as the Tieman and fan types, give the best results in the shortest possible time. It is very desirable to allow the lumber to cool off in the kiln before removing it. That is to say, shutting off the heat in the kiln, and allowing the lumber to cool down for twenty-four hours or so, not having the temperature of the lumber higher than 90°. If it is higher, and there is much dampness in the air outside, while cooling, the lumber will absorb dampness quite readily.

Testing and Samples of Lumber

It has been found advisable to have one sample test for every three thousand feet of lumber in the kiln. In testing lumber, it is best to cut off at least two feet from the end to eliminate end drying in the

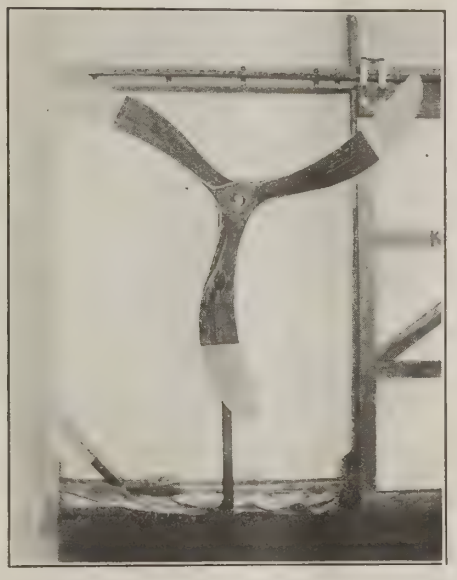


A unit spirit level protractor for use with level bench without a pitch card

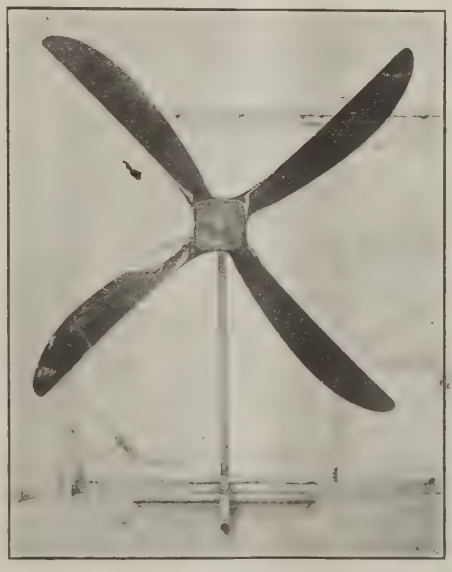
yard pile. Next, cut off about two feet, or a board that will weight more than five pounds and not greater than ten. From this board, take off two one-inch disks, and weigh the disks immediately upon sawing. It is advisable not to saw with a circular or trim saw, but use a band saw where possible, as the heat of the smaller high-speed saws tend to dry the disks; thus they will lose a small amount of moisture. After cutting off the disks, coat both ends of the two-foot test board and weigh as soon as possible. Any good tar or asphaltic base, such as roofing cement, can be used for coating the ends of the boards. The sample boards should be distributed throughout the kiln, not in exposed portions, as there will naturally be a difference of about two per cent in moisture content of the test boards and the lumber as a whole. That is to say, the test boards and sample boards taken from stock after kiln drying will weigh less by one to two per cent than the stock tests. Roughly speaking, a good kiln should dry quarter-sawed oak from fiber saturation, from five to seven per cent moisture content, at the rate of three-quarters to one per cent a day. Other woods can be figured at from one to one and a half per cent a day. Of course, the lumber can be pushed at a higher rate, if desired, but it is unwise to do so.



A practical type of balance stand used at the American Propeller factories

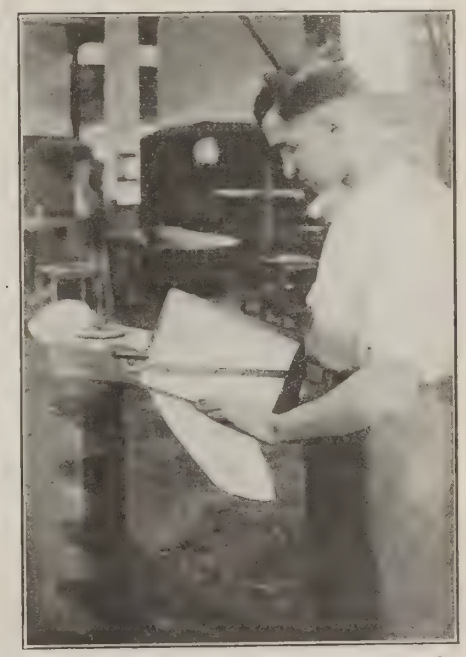


A Paragon torsion pitch three-blade propeller on a balance stand



A four-bladed propeller awaiting one of the final inspections

The disks, after weighing, should be put in an oven, with a temperature of approximately 180° to 200° F. and allowed to remain for twenty-four hours. It is not advisable to cut the disks in small pieces, as is often-times done. The one-inch square disk, the width of the board usually gives a very close result. After the disks have dried for twenty-four hours, re-weigh them, place them back in the oven, and allow them to dry at least six hours again. Then weigh them again, and if they have not lost in weight, or are very nearly constant, take that figure and subtract it from the weight green. Then divide by the oven-dried weight, which will give the percentage of moisture in the disks. From this it is easy to calculate what the oven-dried weight of the two-foot test boards should be. Having given the weight of the green test boards, it is then only necessary to weigh the test



Universal protractor for use with level bench using pitch cards

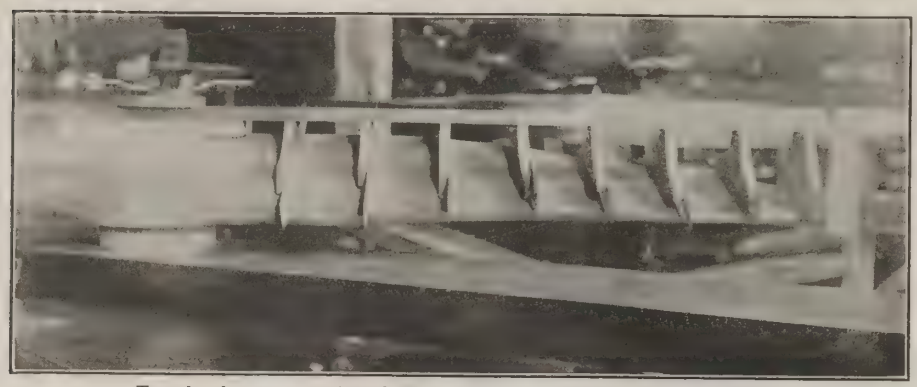
boards at least every two days and figure the percentage of moisture in the test boards at that time. From experience, it has been found desirable to mark the weight and percentage of moisture directly on the test boards.

Shop Conditions for Lumber

It is advisable after cooling off the lumber in the dry kiln to pile immediately on cross sticks in the shop proper, so that it will attain shop conditions in regard to humidity and temperature, as soon as possible. The lumber must not be put in a cool, damp basement, or outside shed. It should be placed where there is good free circulation, and where there is the same amount of humidity as in the shop proper. If the lumber is to be used at once, it can go directly from the dry kiln to the manufacturing of the propeller, in which case it necessitates a longer time in equalizing after the lamination is cut out and dressed.

Laminations

After having carefully made the correct lamination layout, and adding correctly the amount of extra stock needed in the manufacturing, then mark out the lamination. In mahogany and quarter-sawed oak it is a good plan to join one side of the lamination first, then plane or dress the



Templet for ascertaining the accuracy of the pitch of the propeller

other side before marking out the lamination.

In rough lumber it is quite hard to see the minor defects. After sawing out the lamination, then drill a one-inch hole for the center of the hub.

Great care should be taken in laying and marking out the lamination, as a careful man at this point will save much time later on in the manufacture and unnecessary expense. When band sawing the sides, save the side shorts for the hub wideners, to be used with the same lamination, cut from the same board. In splicing laminations it is expedient to match boards of the same texture and density. Next, make the serrations for the hub wideners when it is required. It is well to check the serrated joints by reversing the hub widener, to see if the serrations match up in both positions. Then glue on the hub widener, allowing the lamination to stay in clamps for at least three hours. Re-band saw the lamination, then dress to size, checking the planer knives for parallel every time they are ground.

Tooth plane and then pile the laminations for equalizing. If the lumber has been dried to a variation not greater than three per cent., it is safe to say that ten days is the minimum required at this time for equalization. If the stock shows slight case hardening, it is not objectionable, especially in quarter-sawed oak. It is advisable in piling, to use a one by one cross stick and from four to five sticks. After ten days, remove several laminations and test carefully for moisture content. Density tests can best be made by weighing the lamination and sub-dividing the weights into three groups, A. B and C. Although the writer believes an expert grader will obtain better results by grading to texture than in grouping for density by weighing. While the density and texture are closely allied, the texture is generally more of a factor in determination of strength of a propeller than specific gravity or density of the wood.

After the laminations have been sorted by groups or grades into three piles, then assemble, placing them on a balancing stand or balancing pin. While this is only a rough balance, exceptional results can be obtained. First, balance horizontally; then check vertically, for exceptional density streaks in laminations. Each lamination should not be balanced separately, as the propeller should be treated as a whole, not each separate lamination. Reverse ends of lamination until balanced.

Gluing

Now that the propeller is assembled, separate the laminations, carefully marking one end of each lamination for reassembly. Place them in the hot box, which should be about 130 to 140° F. and merely heated by steam pipes, not introducing any extra moisture than is ordinarily in the glue room proper. Allow the laminations to stay from 10 to 20 minutes, so they will become thoroughly warm to the hand on the outside, in order to avoid chilling the glue. Of course, the hot box should only be used with hot glues.

It has been found that the cowls which extend the entire length of the laminations are preferable to the small blocks which are sometimes employed. Cowl boxes are very good where enough pressure can be applied. There has been considerable difficulty in obtaining pressures as great as fifty pounds to the square inch at the hub. Presumably, a few manufacturers have had some trouble with glued joints at the hub.

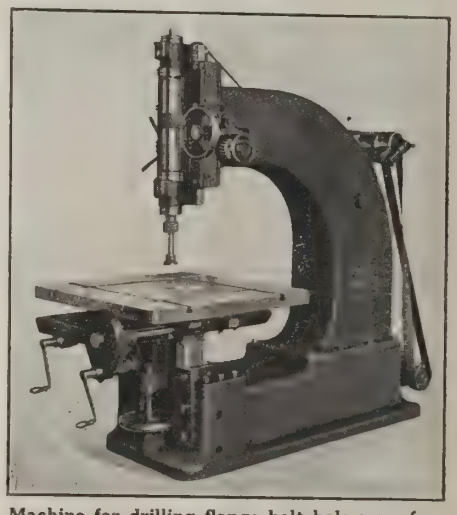
When gluing quarter-sawed oak, it is expedient to have the lumber dried from five to seven per cent., and great care should be taken in the steaming process in the dry kiln, as all tannic acid which can be removed is best for the glue. When oak contains a high percentage of moisture, and considerable tannic acid, the glue will gradually deteriorate, especially if it is slightly alkaline.

The propeller should not be removed from the retainer or clamp in less than twenty-four hours. While the glue sets in a much shorter time, it has not thoroughly dried and reached a high tensile strength. When the retainers have been removed, glue on any scabs or veneers which are necessary, then drill the large hub hole to within about one-quarter of an inch of full size.

Plane the pitch surface of the hub, then center for the first cut on the carving machine. Care should be taken to obtain a true center line passing through the center of the hub hole. After the first cut, hang the propellers horizontally for two weeks on a rack in the shop.

Carving Machine Methods

In the earlier methods of propeller manufacture, most propellers were cut out by hand, and today, in orders of less than



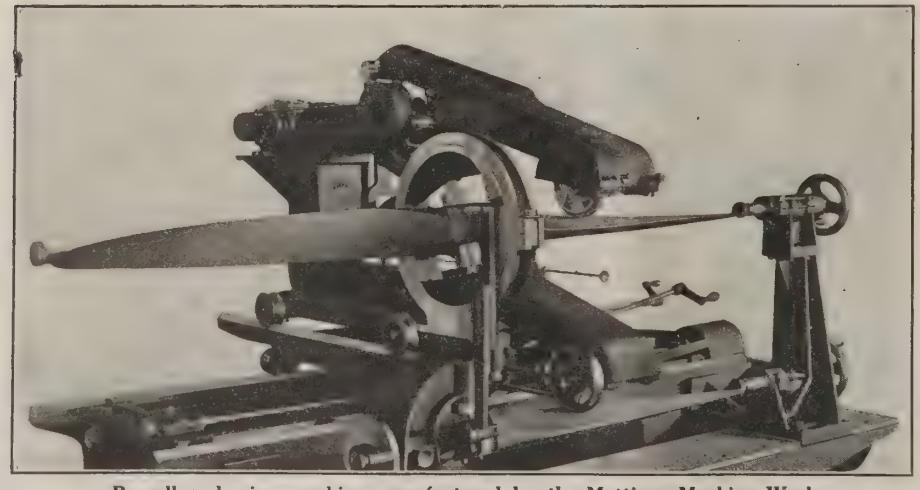
Machine for drilling flange bolt hole manufactured by the Mattison Machine Works

ten, it would not pay to make up patterns and templets necessary for a carving machine. There are several small rotary hand cutters which can be used to some advantage. The carving machine can be divided into two general types, where the propeller knives move in relation to the propeller, or where the propeller moves in relation to the knives. Carving machines generally cut with the grain, distinguishing them from the turning lathes, which cut cross the grain, either one surface of the propeller at a time, or cutting completely around the propeller.

Machine Work On Clubs

When the propeller has been thoroughly seasoned in the drying-out process, it is necessary to very carefully re-center for the second machine cuts. If this is not done, it is very easy to undercut one side of the propeller, not giving enough stock to finish within the limits. The second cut from the ordinary carving machines or turning lathes can be almost to size.

Probably the best practice is to drill the hub hole to size and oil, then the fillers for the hub flange on both sides of the propeller. While the filler is only necessary on pitch side, from continual handling, the advantage of the filler on the camber side will be seen. The old method of drilling the flange bolt holes from either side of the propeller has been superseded by the new type of machine,



Propeller shaping machine manufactured by the Mattison Machine Works

which will cut the flange bolt holes completely through from one side.

The next operation is exceedingly important, that is the shaper operation. Place the propeller on the shaper pattern, using the second machine cut center holes, and a spindle to fit the large hub hole, placing the propeller pitch side down, the pitch side having been accurately dressed before. It is not necessary to leave more than one-eighth of an inch over size in width at the hub. If the shaper pattern is carefully made, it saves considerable trouble in getting face alignment and in obtaining a vertical balance.

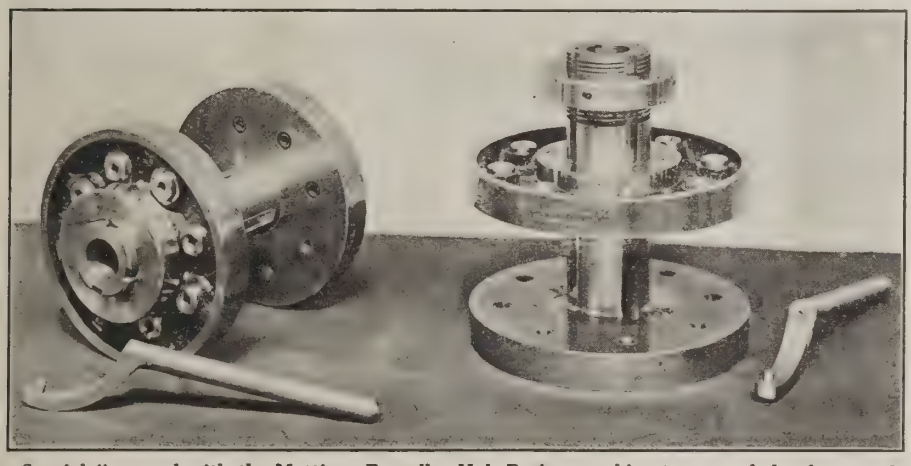
Bench or Hand Work

There are several methods used for working the propeller out by hand or finishing the propeller. The first one is to have a bench which is level in all directions, and have the block upon which the propeller rests parallel with the bench, using an ordinary wooden protractor with templets to fit the oval or round parts of the propeller. The edge alignment is taken by measuring up from the bench at each station. The next method is to use an ordinary buck with a spirit level protractor and metal or wood templets for each station. Some difficulty arises with the buck method of manufacture, as it is rather hard to define the center line, especially when it is nearer one edge than the other, and then get the protractor to read 90° to the center line. While the discrepancy is not very great near the tip, it has caused a difference of a quarter of an inch in width of the propeller at the second station from the hub, because the protractor or templet was not square to the center line. Both of the above methods necessitate having the pitch face parallel to the camber face of the hub. The writer thinks the propeller should be made from the pitch face of the hub only, and on those lines has constructed a special jig which will allow the propeller to be manufactured from the pitch face only. The jig can be used at any possible position of the propeller. It will determine the center line by using a dowel to go into one or more of the flange bolt holes. Start at the hub and work out with the jig. The photograph shows only one-half of the templets. The round or camber side is hinged to one corner of the templet shown, preferably the leading edge. The propellers are made completely from the pitch hub surface, and when finished, there is a true center line from tip to tip of the blades, the face alignment, edge alignment, pitch, and necessarily the track is correct for all stations. Where a trigger hole is used, it is determined from the jig, and if there is a slight mistake in boring the flange bolt holes or trigger hole, the jig will show before any hand labor is done on the propeller. By a few details not shown, it is possible to have tolerance readings taken directly from the jig.

In balancing the propellers in the white, it is advisable to balance or scrape on the pitch side, as from an engineering standpoint, the most effective work is done by the camber side. After the propeller has been balanced, it is then time for the first careful inspection by the manufacturer, as to tolerances, etc. All propellers change pitch and shape during the first forty-eight hours, after coming off the bench. Each design has its own particular characteristics, which will have to be worked out from experience only. When these characteristics are known, they can easily be corrected by the workman on the bench. After checking the propeller at the end of forty-eight hours, it is then expedient to fill as soon as possible. The kind of filling depends on the kind of wood used.



A rotary hand cutter in operation



Special jigs used with the Mattison Propeller Hub Boring machine to space holes for attachment to Liberty motor

Tipping Propellers

There are several methods of putting metallic tips on propellers. Copper and brass are most commonly used, although in a few cases aluminum has been used. After considerable experimenting, the best method seemed to be the use of both screws and rivets. Where only screws have been used and the metallic tips have been removed, it has been discovered that the heat of soldering the heads of the screws has dried out the moisture in the tips of the propeller, thus causing checks. Rivets, if put in properly, will undoubtedly give good results, although rivets and screws can be used successfully. Rivets should be used where the propeller is not



Unfinished propellers hanging in seasoning room of the American Propeller Co. of Baltimore

thicker than one-half inch, and the screws in the thicker parts of the blade. It is a good plan to countersink the wood with a drill for the screw and rivet heads. On some propellers it is not advisable to recess the full width of the blade, because the double recessing thins the blade. In soldering the screw and rivet heads, care should be taken not to use too much acid, as the acid has been known to cause detrimental results to the wood and glue. Probably the best method to be used in tipping a propeller is to recess the pitch side only and router on the camber side of the blade. If proper care is taken when putting in the rivets, no splits will occur. Care should also be taken with the soldering not to get too much heat, as there have been cases where the metallic tip became so warm that it scorched the wood underneath.

Metal tips should not be used except where there is a water spray or where the propeller is liable to get too near the ground. The leather tips are far preferable for ordinary aeroplane use. Leather can be put on in either of two ways: First, with the hair side of the hide next to the blade, or the flesh side next to the blade. There are good reasons for either way. Pigskin has been shown to produce the best leather tips. These tips want to be inspected quite carefully for defects. It is best to mark out the tips and weigh them, then scive the edges. It is a good plan to put the lap on the camber side on some propellers, and on others it is best to have the lap on the pitch side. It depends entirely upon the shape of the blade. The leather tips should be thoroughly sized, also the wood propeller. When they are dry, coat the propeller and tip with fresh coating of glue, using a warm iron to smooth out the wrinkles and fulness in the leather, unless a very slow setting glue is used. When the leather tip is on, rebalance the propeller, as some leather tips absorb a great deal more glue than others. When the tips have thoroughly dried, shellac them.

Linen tips are very desirable for high speed propellers, as the linen binds the propellers together, and keeps the atmosphere from getting at the glued joints. The linen should be brought up on the propeller as far as possible with the width of the goods, using one selvage edge to go around the propeller at the point nearest the hub, as any tendency to ravel will be eliminated by using this selvage edge. The linen should be thoroughly washed and shrunk before using, as the average linen shrinks from one to two inches in the width of 36-inch goods. While it is not entirely necessary to glue-size the wood propeller before applying the linen, it is advisable. Care should be taken in putting on the glue-size, either for the leather or linen tips, as it will often put the propeller out of pitch. It is best, in most cases, to glue-size the camber side first, let it dry, then glue-size the pitch side. This will often save the propeller from going out of pitch. Before proceeding any further with the propeller, it should be carefully balanced and inspected, since it is impossible to balance the propeller at a later stage.

Painting Propellers

Linen and leather tips should be shellaced, flange bolt holes and hub holes, etc., should be carefully oiled and filled, and transfers placed on the propeller. When they have dried for about forty-eight hours, then give them a coat of varnish. It has been found advisable to use the same spar varnish throughout, thining the first coat with turpentine from fifteen to twenty-five per cent. This thin varnish penetrates the pores of the wood. Next, apply the four coats of finishing varnish, hairing off between each coat. The time required for drying between each coat is determined by each maker of spar varnish. When dull finish propellers are desired, use a brush with pumice and water. The varnish drying rooms should be kept at a moderate temperature and a fairly high humidity.

In hanging propellers in the varnish room it is much better to hang the propellers in a vertical position, since it is much easier to correct for sagging varnish in the horizontal balance than it is to have a sag on one side of the propeller, which causes a bad vertical balance and is difficult to correct. If the propellers are hung in a vertical position, care should be taken to reverse the top and bottom between each coat.

After the propeller has been carefully checked for balance and inspected for pitch and track, it is ready to place in the crate. If the propeller is not to be used immediately, a wax or paraffin substance should be put in the flange bolt holes, also coating the inside of the hub hole.

The box for crating the propeller should be made of thoroughly dried lumber, as green lumber is neither good for the varnish, nor the propeller itself. The type of box depends entirely upon where the propeller is to be shipped, and the length of time it will remain in the box. A propeller must not be expected to last indefinitely in a damp box placed in a cold, damp storage warehouse, as in a short time the varnish will deteriorate, and the moisture open the glue joints.

Conditions in General

Propellers, correctly speaking, should be made for certain climatic conditions where they are to be used. Since this is not possible, it is better to dry all lumber to about seven per cent. as it will be seen from reabsorption curves of lumber, it does not create as many internal stresses as lumber which is naturally dried out by evaporation. Thus, clubs which contain a smaller amount of moisture are much better than those which contain a high percentage of moisture, when they are to be shipped to various climates. Although there are places in the world where lumber containing twenty per cent. moisture can be used with complete satisfaction, other places require only five per cent. moisture, and even then, will cause trouble on account of the extreme dryness and heat.

After having tested a great many completed propellers which had been around the shop for eight weeks or longer, there was found to be very slight variations in moisture content, and even where there was decided case hardening in the lumber, it was entirely relieved in the gluing and manufacture of the propeller. Lumber which is dry comes to the condition of the shop, if it is given enough time in manufacture, that is to say, the shop humidity and temperature predetermine the amount of moisture in the propeller. Lumber which is dried below shop conditions comes within a very few per cent. of that which dries down in the shop. There will only be a variance of from one to two per cent.

In the pamphlet published by the Signal Corps, U. S. Army, Inspection Department, entitled: "Information for Inspectors of Airplane Wood," and prepared at the Forest Products Laboratory, Forest Service, dated 1918, page 43, there is a composite curve showing the moisture content of woods by different humidities and room temperatures.

During the process of manufacture, propellers should be kept in a horizontal or flat position on a shelf, or on the floor, as the variation in room temperature and humidity, from top to bottom, causes the propellers to change unequally.

The shop should be kept at as near an even temperature as is feasible, although variations from night to day of from ten to fifteen degrees will not materially hurt the propeller. The main thing in the shop is to watch the humidity not to get too great a variation, or, in other words, keep the humidity as nearly constant as possible.

Balancing Stands

There are two types of balancing stands in use, one using the knife edges about eight inches long, the other using the roll type bearing. Either will give satisfactory results, although the knife edges will give less cause for dispute in balancing. The knife edges should be about one-thirty-second of an inch wide, of hardened steel and about eight inches long, parallel and level in both directions, and checked by diagonal leveling. The stops at either end should be tested very carefully with a square to see if they are at right angles to the knife blade edges. If they are not, when the propeller is rolled on the edges, the horizontal axis of the balancing mandrel will not be at right angles to the knife edges. Probably the best type of balancing mandrel is the two-piece tapered or cone type. The rolling part of the mandrel on the knife edges should not exceed one inch in diameter. Considerable discussion has taken place as to the vibrations received or transmitted to the balancing stand. It has been discovered that if both knife edges receive the same vibration at the same time, the propeller will balance irrespective of the vibration of the knife blades, such as vibrations imparted by machines, etc., in the building.

The most satisfactory propeller to build is one which has a low pitch angle, for it is more certain to stay in pitch and track. High-pitched propellers are hard to keep in pitch and track because too much end grain is exposed, allowing the propeller to dry out unequally which results in a continual twisting action in the propeller. Three and four-blade propellers should be built in the detached blade method. That is to say, each blade being built separately and dove-tailed together by dowels and keys. However, four-blade propellers can be built as two separate two-blade propellers and halved together at the center. Since the speed of three and four-blade propellers is never excessive, the detached method is preferable, not only from the manufacturers' point of view, and shipping, but also from the aviator's standpoint, as it is possible to replace one blade if it is damaged, in place of discarding three or four.

Summary

In summarizing the methods used and the care to be taken in manufacturing propellers, there are a few points which ought to be emphasized. These are namely: careful grading of the lumber, kiln drying (the United States Government having shown the woodworking industries the correct processes), sorting and grading laminations, balancing laminations, gluing, shaper operations, workmanship and final balance. If these essentials are followed carefully, the manufacture of good propellers will result.

The foregoing suggestions are adaptable to the manufacture of propellers in quantities. Small orders should be treated merely as experimental work.

NAVAL and MILITARY AERONAUTICS

Army Plans Flight Around Country's Border

The most extended flight yet planned by the Air Service of the U. S. Army, in the interest of recruiting, charting of routes, and the locating of landing fields, is contemplated by Lieut. Col. R. S. Hartz, J. M. A., A. S. A., commanding officer at Bolling Field, Washington, D. C.

Colonel Hartz will take with him as reserve pilots Lieut. Ernest E. Harmon, R. M. A., A. S. A., Lieut. Lotha A. Smith, R. M. A., A. S. A.; also as a mechanic, Sgt. John Harding, Jr.

The aeroplane used will be a U. S. Martin Bomber.

The flight as planned will total 7,805 miles as follows:

Washington, D. C., to Miami, Fla....1,120 miles
Miami, Fla., to San Antonio, Tex....1,140 miles
San Antonio, Tex., to San Diego, Cal..1,129 miles
San Diego, Cal., to Seattle, Wash....1,170 miles
Seattle, Wash., to Duluth, Minn.....1,375 miles
Duluth, Minn., to Augusta, Maine...1,345 miles
Augusta, Maine, to Washington, D. C.. 535 miles

Total .....7,805 miles

The flight will not be direct between cities, but will vary according to considerations and demands to be determined by Colonel Hartz.

Summary of Flight—Miles (estimated), 7,805; States in which flights are to be made, 31; cities passed over or near, 95. Passed over or near the following: National lumber reservations, 29; government projects, 7; water sheds and drainage slopes, 9; mountain ranges and mountains, 36; oceans, gulfs, bays, seas and lakes, 48; railroads, 27; rivers, 88; transcontinental routes, 13; miscellaneous, 6.

The Air Service Photographic Recruiting Expedition

Forty-six cities and towns in six states, Delaware, Maryland, New Jersey, Pennsylvania, Virginia and West Virginia, will be visited by the photographic recruiting expedition which will leave Langley Field, Va., on or about July 22, 1919.

The expedition will travel in five Curtiss H aeroplanes, accompanied by a motor truck and lorry. The truck and lorry will be a complete photographic developing and printing establishment containing all the latest apparatus for the production of finished work and a place where recruits may obtain their first insight into the work performed upon the film and plate after it is taken from the camera.

Distribution of Victory Medals Delayed

The War Department authorizes the following statement:

The distribution of Victory Medals is delayed. In view of the large number of applications now being received, attention is called to the fact that Victory Medals will not be ready for issue for several months. The method of distribution has not been determined, but it will probably follow the general scheme now being used for the distribution of the Victory Button. Wide publicity will be given to adopted scheme when medals are ready for issue. Applications for medals should not be made until that time.

Resources of Air Service in Equipment and Personnel Officially Reported

The War Department authorizes publication of the followig information on the service plane resources of the Air Service:

On March 1, 1916, the total resources in planes of the Aviation Section, Signal Corps, was 13 aeroplanes, 4 hydroplanes, and 1 flying boat.

On March 19, 1916, the first aero squadron went into Mexico with eight Curtiss JN-3 planes, a type now inferior to the primary training plane. After being in there two months, four more planes were shipped to them.

At the present time there are on hand in the United States 1,240 battles planes in serviceable condition; enough to make approximately 50 squadrons. Besides these there are in storage 862 battle planes that could be put into commission almost immediately.

The advanced training plane, of the type now used for forest patrol, could if necessary be used as an observation plane. Of these there are 653 in commission at the fields, and 156 in storage. A total of 52 squadrons of training planes could be assembled.

The resources of the Air Service in planes are as follows:

Type	Designed for	Number in commission	In storage, with motors taken out	Total	Number of squadrons possible
DH-4	Observation				
	Day bombing	1,191	842	2,033	81⅓
Spad	Pursuit	27	...	27	1
Le Pere	Service	18	...	18	⅔
Handley-Page	Bomber	4	20	24	1
S.E. 5	Advanced training	46	57	103	4
JN6-H	Advanced training	653	156	809	32
S4-C	Advanced training	400	...	400	16
Total.....		2,339	1,075	3,414	136

There are in the United States to-day 1,394 flying officers. This number includes flying officers on staff duty, etc.

Information on the number of planes available in the Southern Department is given herewith. This, however, is not an accurate indication of strength immediately available, due to the fact that while there are sufficient planes and pilots for the planes, there is not sufficient enlisted personnel to take care of them without transfer from other branches of the service or recall of men furloughed to the reserve.

There are on duty now about 73 men with a squadron of ten planes and two or three other squadrons are being organized at various points in the Southern Department.

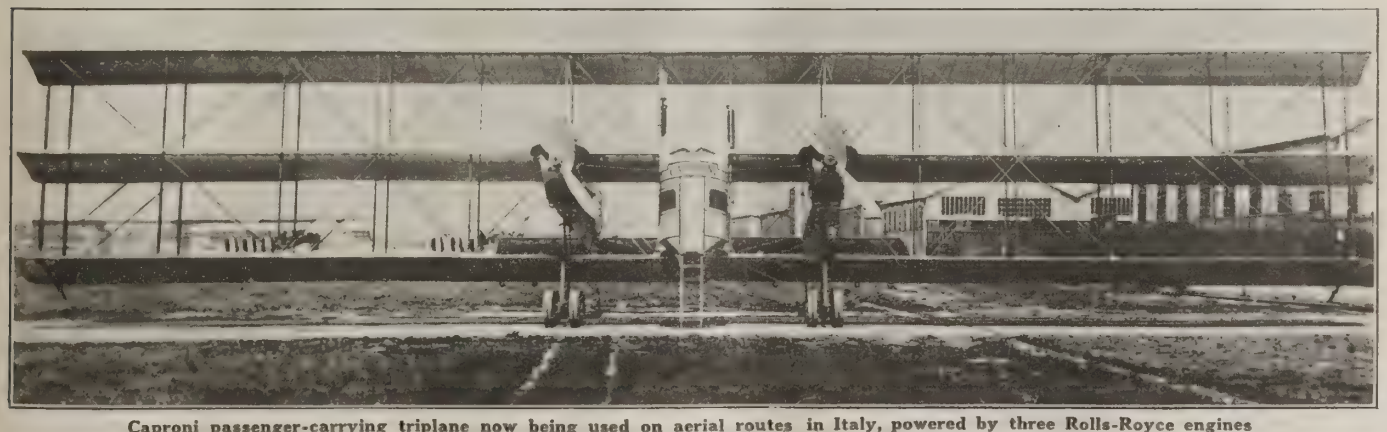
Following is a table of planes available, by types and fields, in the Southern Department, showing a total of 788 classed as active planes and 878 obsolescent. The 788 would be available for immediate use, and 878 could be used in addition if necessary.

Special Orders Nos. 150 to 155, Inclusive

The appointments on May 12, 1919, of the following-named Air Service officers, United States Army, are confirmed.

To be first lieutenants, Air Service: Thomas James Abernethy, Neil J. O'Leary, Charles W. Baker, James LeRoy Zimmerman, Sam Love Ellis, Lyman T. Greve, Marion Francis Hart, David P. McDaniel, Robert Ross, John Andrew Farrell, Russell Milton Hayes, Walter Augustus Stoever, Glenn Scott Cobb, Miller Smith Tyson, George Earl Marshall, Leonard Sullivan, David A. Kohler, Roy Bazanquith Ormond, Roscoe Turner, Edwin Maddox Hooper, Tarry E. Montgomery, Byron Thurman Johnson, David Wilber Lewis, Gilbert Shaw Graves, Jr., Raymond Ashton Mitchell, Galen B. Croxton, George T. Marsh, William Raymond Flourney, Harry Pope Clarke, Jr., Carl Browne Squier, Raymond Keran O'Brien, Douglas R. Denman, James Lytle Hamilton, Merle William Bogert, James A. Reardon, James William Flanagan, Roy Frank Jehl, Charles Thomas Somerby, Leon J. Soisson, Lucius Bowen Nichols, Richard H. Dietrich, Isaac Williamson Baugh, Robert Butler Lindsey, Allen Martin Ham, Leo B. Gape, Francis Fleming Taggart, Harvey Hodges Holland, Raymond

(*Continued on page* 945)



Caproni passenger-carrying triplane now being used on aerial routes in Italy, powered by three Rolls-Royce engines

FOREIGN NEWS

Handicaps in the London Aerial Derby

From an inspection of the Timekeeper's table for the Aerial Derby, flown on June 21 last, the following points of interest are elicited:

The times made for each lap by individual competitors were very consistent, proving that in each case a good course was flown. The only exceptions were Capt. Gathergood (No. 7) and Lieut.Col. Henderson (No. 4). The former increased his speed of 126.42 m.p.h. for the first lap to 132.34 m.p.h for the second. His average speed for the total distance of two circuits was 129.38 m.p.h. The latter was compelled to make a temporary landing at Hounslow on his second round for adjustments, which explains the discrepancy in his lap times; but for this he would probably have come near to winning the sealed handicap. The fastest lap was made by Capt. Gathergood, viz., 42 mins. 50⅗ secs. The average speeds stated above are, of course, equivalent to considerably greater speeds on the straight and in calm air. The turning points reported that, with one or two exceptions, all competitors flew low and close.

Having regard to the great disparity in the speeds of the competitors, which ranged from 70 to 133 miles per hour, the handicapping must be adjudged a good one. Only 17 minutes separated the first and last of the seven machines which completed the course, and less than five minutes separated the second and sixth Maj. J. H. Ledeboer and Mr. C. T. Glazebrook, the official handicappers, are, therefore, certainly to be congratulated on their work.

No prize was offered for the fastest time third place, but it is understand that a special trophy will be presented to Mr. Manton for this by the Grahame-White Co., Ltd.

The London Aerodrome silver medal will also be presented to all pilots (except prize-winners) completing the course, and the London Aerodrome bronze souvenir medal to all pilots who started but did not finish.

Allied Air Service Committee Under League of Nations Urged

London, July 13.—The practical co-operation between Great Britain, America and France by the formation of an allied aviation committee of the League of Nations is now vigorously advocated. The flight of the R-34 airship to America and her return and the enthusiastic reception accorded her on the other side by Americans again bring this matter into prominence.

It would be a sound policy, it is contended, to invite America's co-operation in the necessary organization and experiments to make trans-Atlantic flights commercially profitable. Much meteorological information is still required and many costly experiments in the construction, handling, loading, embarking and mooring are absolutely essential before the general public can be invited to accept the commercial airship as a regular means of transportation between Europe and America. The committee must be composed of practical men and not theorists, and influence should play no part in the selection of its members.

In addition to the work on the trans-Atlantic airships it would, of course, cover the whole field of aeronautical experiment and research by allocating various practical work to the air services of the respective countries represented. So far as Great Britain is concerned the initial step is essential before the formation of a committee, namely, the transfer of airships from the Admiralty to the Air Ministry.

Baroness De La Roche, Altitude Record Holder, Killed

Paris.—Baroness De La Roche, the famous French aviatrix, who holds the world's altitude record for women, was killed in an accident at the Crotoy Aerodrome. The Baroness received her pilots' license in 1910 and was the first woman to fly over Paris.

Vickers Trans-Atlantic Plane at Amsterdam

At the Air Exhibition at Amsterdam the Vickers-Rolls aeroplane in which Sir John Alcock and Sir Whitten Brown made their crossing is to be on view. During the exhibition an aerial service, which is to be maintained afterwards, between Paris and Amsterdam, should do much to keep interest alive in the show.

Swiss Flier First Across Alps in a Hydroaeroplane

Geneva.—The Alps were crossed for the first time by a hydro-aeroplane on July 12. Taddioli, a Swiss aviator, left Sesto Calende, Italy, at 9:30 o'clock and arrived at Geneva two hours later.

The aviator crossed the Simplon and flew over the valley of the Rhine and Lake Geneva.

D'Annunzio Offered Direction of Civilian Aviation in Italy

Rome.—The Italian Government has offered Gabriele D'Annunzio the post of Director-General of Civilian Aviation. D'Annunzio held a commission of Lieutenant Colonel in the Italian air service during the war and engaged in many bombing expeditions, including the raid on Vienna.

Albert Vickers, Aeroplane Constructor, Dies

London.—Albert Vickers died at Eastbourne on July 12. Albert Vickers was formerly chairman of Vickers, Ltd., one of England's greatest manufacturers of steel products and also of aeroplanes.

Mr. Vickers was active in sports, taking particular interest in motor-boat racing, shooting and fishing. He was born September 16, 1838. His first wife was Miss Helen Gage of Boston.

He had been decorated with the Order of the Rising Sun of Japan and was made a Knight of the Grand Cross of the Order of Naval Merit of Spain.

Aircraft Equipment of French Naval Aviation Service

From a statement issued by the French authorities one notes that on October 1, 1918, the French Navy possessed 870 avions or hydravions, 59 airships, and 198 observation balloons, divided up as follows:

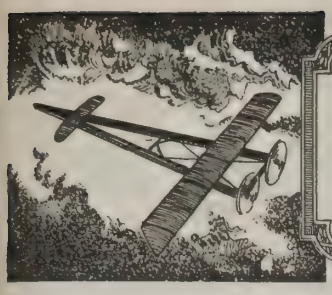
Sector	Avions or Hydravions.	Dirig.	Balloons.
Dunkirk-Cherbourg	168	21	22
Brittany	104	11	39
Loire-Bidassoa	74	7	21
Mediterranean (French coast)	110	4	41
Corsica	38	2	0
Portugal	16	0	0
Algeria-Tunis	176	11	31
Morocco-Senegal	44	0	0
Corfu	54	3	12
Ægean Sea	86	0	32
	870	59	198

Lieut. Cortinez Holds Altitude Record for South America

When the news first came to Europe recently that Lieut. Cortinez of the 1st Aviation Company of the Chilean Army had successfully flown across the Andes and back, it was not then realized that during this remarkable flight he had also established a height record for South America. For many years the height of 6250 metres recorded by the late Mr. Jorge Newbery, who lost his life in an essay to fly across the Andes, had been unchallenged. This year, however, Lieut. Parodi of the Argentine Army, attained to 6,480 metres on a Nieuport plane which was eclipsed by Lieut. Cortinez within a few days on crossing the Andes on a "Bristol" monoplane at an altitude of 6.500 metres.



Interior view of a Grahame-White passenger-carrying plane. The comfortable glass-enclosed cabin shuts out the roar of the engines



ELEMENTARY AERONAUTICS and MODEL NOTES

By John F. McMahon



Interesting Model Motors Used by English Model Flyers

Experimenting with models driven by electricity has never been attempted in this country to the knowledge of the writer. The only one to have experimented in this respect with any degree of satisfaction was Mr. H. R. Kerruish, an English model flyer who experimented with a model driven by an electric motor and carrying its own batteries. It weighs inclusive 9½ ozs. It had an area of 3½ sq. ft. The thrust (static) given is 2 oz., which is just sufficient to fly it, leaving hardly any reserve of power. The chief dimensions are: Span, 4 ft. 6 ins.; chord, 9 ins.; overall length, 2 ft. 11 ins. Elevator, span 18 ins., chord 4 ins. The propeller, 14 ins. in diameter and 10 ins. pitch. The complete weight of the plant is 5.5 ozs., and of the model, 4 ozs. It is very lightly built, but nevertheless is quite strong. It flies at 7:15 m.p.h. in a dead calm, but will not fly in any wind. The power plant is made up of a common tri-motor (tripolar-motor?) specially wound and carefully lightened, driven by six small cells constructed somewhat on the lines of the Delarue silver chloride cell, but embodying certain alternations which are known only to Mr. Kerruish. The thrust of 2 ozs. mentioned above is given off by the plant for a period about one and a half minutes. He cut down weight in every possible way, carpet thread soaked in glue for bracing is used instead of wire, and the planes are covered with the lightest chiffon doped with the thinnest solution sufficient for coherency. The model has flown quite well in suitable weather. The model was given its initial flight in the road opposite the inventor's house after dark, when little traffic was about, enough light to do so being afforded by the gas lamps. The model was started off in the middle of the road and the inventor keeping up with it by running, which was possible owing to its slow speed. As it has such a small reserve of power, it only rose about 4 ft. high, but kept fairly consistently at that height, so that it was possible to keep it going in the direction desired by lightly pushing the front to one side or the other. On one occasion the model was steered down the road in this manner for a distance of 152 yards, the flight then only finishing owing to a connection working loose.

Another form of motor is the CO_2 type, which is one getting its power from carbon dioxide gas.

Carbon dioxide gas in a liquid form is a well-known commercial product in England, stored in steel cylinders. At a pressure of some 35 atmospheres this gas condenses to a liquid at 0° C., or it may be liquefied at ordinary atmospheric pressure by a temperature of —78° C. The liquefaction of the gas can be effected either by evolving it in a strong closed vessel, so that it is condensed by its own pressure, or by pumping the gas by means of an ordinary forcing pump into a strong wrought-iron or steel receiver, kept during the process at a temperature of 0°. As soon as the volume of gas pumped in amounts to about thirty-seven times the volume of the receiver, each stroke of the pump produces a further condensation of the gas which is pumped in, and the vessel is easily filled with liquid CO_2, which is colorless and transparent. On being allowed to escape into the air, more especially if it emerges through a fine nozzle attached to the vessel, part of the liquid at once evaporates and assumes the gaseous state, so much heat being thereby lost that the remainder has no longer the necessary heat to maintain it in a liquid state. It therefore promptly freezes, thus producing a white snow-like mass (known popularly as carbonic acid snow), which evaporates comparatively slowly.

Liquefied CO_2 in expanding produces an enormous pressure which can be readily used in a motor provided that the freezing difficulty just referred to can be successfully overcome; it has this advantage over compressed air, that for the same quantity of gas the pressure on the reservoir is much less, which removes the likelihood of an explosion—giving either a reduced weight or a greater factor of safety. One peculiarity of the liquefied form of the gas is that under the application of heat the liquid form expands more than the gaseous —being an exception to the rule that liquids expand by heat less than gases.

In the Cetonia CO_2 motor (by term motor we mean complete plant) the freezing difficulty is overcome by using a cylinder filled with water at a temperature of about 90° C.; through this cylinder (or hot water bottle) runs a network of tubing into which the liquid CO_2 is passed direct, immersed as already stated in nearly boiling water. Now since CO_2 cannot remain liquid at a temperature above 31° C., its critical point, it immediately turns itself into a gas, and freezing is absolutely prevented by the specific heat of the water, which is very high.

Smallest Model of Curtiss JN-4

What is probably the smallest model to be built of the Curtiss training plane is less than 8" in span, and in spite of its small size all the parts have been accurately made. The struts are less than an inch in length, and yet they are tapered and streamlined to true section. The propeller is 1⅜" in diameter, and it has been carved with an accuracy unusual even in larger models. The model was made by G. Francis from plans and a description which appeared in the April 23, 1917, issue of Aerial Age.

The general dimensions of this machine are as follows:

Span, upper plane	7¾"
Span, lower plane	6"
Wing chord	⅞"
Gap between planes	⅞"
Stagger	3/16"
Length of machine overall	4¾"
Height of machine overall	1½"

The upper plane is made in three sections, and the lower plane is composed of two sections. The planes have an Eiffel 32 wing curve. Interplane struts between wings are placed as follows; there are 2 pairs of struts above the fuselage holding the center section plane, from these the intermediate struts are spaced 1⅛", and from these the outer struts are spaced 1¼". This leaves an overhang of 1¼". Both upper and lower planes have a slight dihedral.

The fuselage is ⅜" wide and ⅞" deep. The forward part of the fuselage is covered with sheet aluminum. The landing wheels are ⅜" in diameter, and they are spaced 15/16" apart. The elevator has a span of 2 13/16". Stabilizer is ⅝" wide, and elevators are ½" wide. The rudder is ⅞" in overall height and 9/16" wide. The triangular fin is ½" high and ½" wide.

All the finish is made to resemble that of the large machine. The wings are champagne color, the top of the fuselage from the pilot's seat forward as well as the cowling around the engine is khaki color; the tail surfaces and fuselage are the same color as the wings. The propeller is made of walnut finished in natural color and coated with spar varnish. Interplane struts, landing gear and tail skids are of spruce, shellaced and varnished.

Owing to the smallness of the machine, the control surfaces are not movable, but all have the appearance of being hinged. Grey silk thread is used to resemble wiring between wings and the control cables.



This model of the JN-4 is only 4¾" long. The wing span is 7¾"



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

R. Stanley Edwards in *Flying* on Aeronautic Slang

(*Continued from page* 902)

Ground-Louse ..... School machine not intended to leave the ground.

Penguin ..... A school machine which can only just leave the ground.

Kiwi .. .. Equipment officer R.F.C. without flying duties.

Shemu ..... Female personnel R.F.C.

Goldfish ... . Chips of bearing metal found inside the crankcase of a worn aeroplane.

Aerial Torpedoes..... A purely imaginary missile, which actually does not exist. Long, torpedo-shaped bombs originated the term, but they are quite different from the aerial torpedo, which no one has yet succeeded in inventing successfuly.

Canary Bird. ..... The albatross distinction mark worn by R.N.A.S. men.

Terms and Slang peculiar to the R.N.A.S

Quirk ..... A probationer, a "greenhorn," a young subaltern new to the Service. Formerly a "quirk" was a derisive term for a "school bus" or aeroplane in which learners were taught to drive.

Blimp ..... A "S.S." or scout submarine airship (small two-seater).

Canary Bird..... The albatross distinction mark worn by R.N.A.S. men.

Terms and Slang peculiar to the R.F.C.

Arp ..... Aeroplane repair park.

Hun ..... A R.F.C. "quirk"—a probationary sub, in the R.F.C., so-called because of the damage he can do to the machines and personnel with which he comes in contact.

Shemu ..... Female personnel R.F.C.

Kiwi ..... Equipment officer R.F.C. without flying duties.

Rumpety ..... School machines of the Farman type.

The following are slang terms used by soldiers throughout the Army and also among others by those in the Flying Service. Most of them belong to the men, and are not used by the officers:—

Slang	Meaning
Bob-Tack	Stuff to clean buttons.
A Yop or Yob.....	One who is easily fooled.
Vamping	Eating heartily.
To be Weighed Off.....	To be punished for an offense.
Tin-Opener	Bayonet.
To Go on the Tack....	To take the pledge.
To Swing the Lead.....	To tell a tall story.

Square Bit.....Best girl.

Slingers .....A meal of bread and tea.

A Scrounger.....A man who always gets what he wants for himself.

Rooty .....Bread.

Quarter-Bloke .....Quartermaster.

Pukka .....O.K.

Poultice-Wallahs .....R.A.M.C. men.

To Muck In.....To share.

Muckin .....Butter.

Baggie .....Sailor.

To Post his Number...To be reported for an offence.

Jankers .....Defaulters' drill.

High Jump.....To answer a summons of breaking regulations.

A Gravel Crusher.....An infantryman.

Get your Number; Dry; Get Under your Blanco-pot ..... Don't talk rot about things you don't understand.



How the New York Aerial Police picks them up, according to *Air Scout's* artist

(*Continued from page* 930)

vided on the outside of the hull for gaining access to the compartments.

This type of flying boat is purely a sport machine designed for pleasure flying. The complete enclosure of the passengers makes it unnecessary for them to don special clothing, as they are fully protected from wind and spray.

The upper plane has a span of 48′-4″; lower plane has a span of 27′-4″; chord 6′-3″ stagger 12″; gap between planes 6′-6″. Weight of machine empty, 2,000 pounds; weight fully loaded, about 2,500 pounds.

The Bellanca 35 H.P. Biplane

One of the smallest successful sport planes is the Bellanca 35 H.P. Biplane which weighs only 400 pounds. It is a two-seater but the forward cockpit can be covered over and machine made to appear like a single-seater. The machine can be used for carrying light express or mail for it has a useful load of 375 pounds.

The upper plane has a span of 26′ and the lower plane has a span of 20′-6″. Chord of upper plane 4′ and of lower plane 2′-4″.

Total wing area, 150 square feet. Length overall 17′-7″. The maximum speed light is 85 M.P.H. and the minimum speed is 34 M.P.H. It can climb at a rate of 820 feet per minute. An actual test was made of its gliding ability in which it was shown that from an altitude of 4,600 feet, a glide of 10 miles was made and the descent required 8 minutes and 5 seconds time. An air-cooled, 3-cylinder, Anzani "Y" type engine is used, weighing 325 pounds.

The Lawson "C-1" Aerial Transport

The Lawson Aerial Transport Type C-1 was designed to carry 26 passengers. It is the first of its kind to be built in America and is probably the forerunner of several designs of the same type which will find an important place in the future of commercial aeronautics. The fuselage is entirely enclosed so that the passengers can enjoy the same comfort and security as found in the most up-to-date methods of transportation. Special mufflers are provided which reduce the usual roar of the engines. When it is desired to carry freight, the seats can be removed. Besides passenger carrying, machines of this kind can be used for express and mail delivery, or news distribution, aerial touring, and exploring. It has a normal fuel duration of 5 hours and its normal speed is 105 M.P.H.

Both planes have a span of 85′ and a chord of 9′-6″; gap between planes 9′-3″; overall length, 47′-7″; overall height 14′.

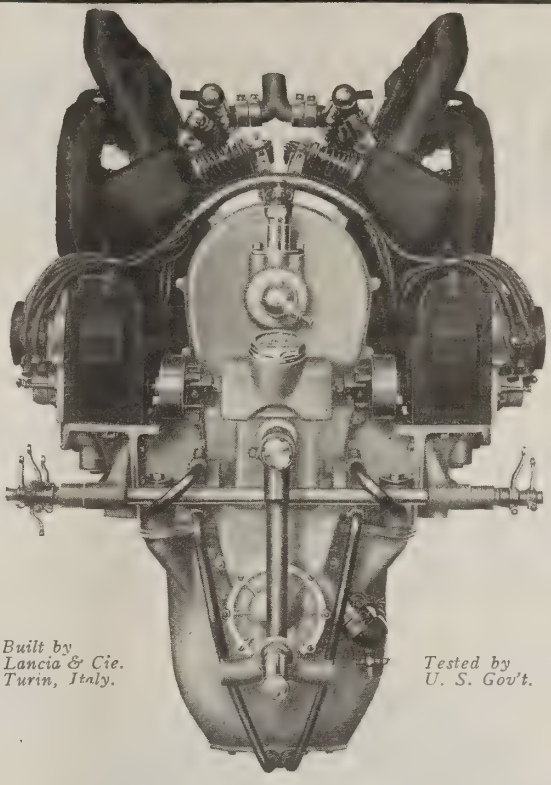
Fully loaded the machine weighs 12,000 pounds. In ten minutes it ascends to an altitude of 4,000 feet with a full load. The service ceiling is 15,000 feet and the gliding angle 1 to 8.

Two 12 cylinder 400 H.P. Liberty engines are completely enclosed in nacelles with radiators on their forward ends and propellers in pusher position. Propellers are 10′ in diameter and revolve opposite one another. Every effort has been made to increase the safety factor on all parts of the machine, and the provision of ample control surfaces makes the machine sensitive to control.

Thomas-Morse "S-7" Two-seater

The side-by-side seating arrangement of the Thomas-Morse S-7 makes it an ideal machine for passenger carrying and for ordinary pleasure uses. The passengers' compartment is upholstered and finished in accordance with best aeronautical practice, and first consideration has been given the problem of comfort and ease of maintenance. This is the first machine of the side-by-side type to employ an air cooled rotary engine. The side-by-side arrangement does not add to the width of the body because at the cockpit the body is no wider than at the cowling surrounding the engine.

Both wings have a span of 32′; length overall, 21′-6; height, 9′-0″. Fully loaded the weight is 1,480 pounds. The lifting surface including ailerons is 322 square feet, and the load per square foot is 4.6 pounds. An 80 H.P. Le Rhone air cooled rotary engine is used. The fuel capacity is 20 gallons, which is sufficient for a 2½ hour flight, and the oil capacity is 4 gallons, sufficient for 3 hours. The high speed is 90 M.P.H., and the low speed 40 M.P.H. In the first ten minutes the S-7 can climb to 6,700 feet.



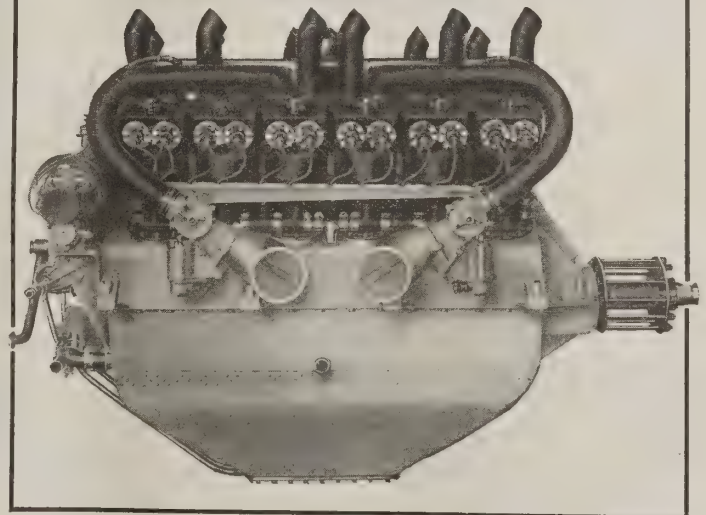
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Tested by U. S. Gov't.

LANCIA AVIATION MOTOR
FOR SALE

This motor has been run only 10 hours in a test for the U. S. Government at McCook Field. The test showed it developed 320 h.p. at 1,380 r.p.m. and weighs 740 lbs. Surprisingly low gas consumption. It is unquestionably one of the most efficient 12 cylinder aviation type motors in the world. A number of spare parts is included with the motor, such as a complete set of extra cylinders, pistons, water pumps, etc. Can be inspected any time.

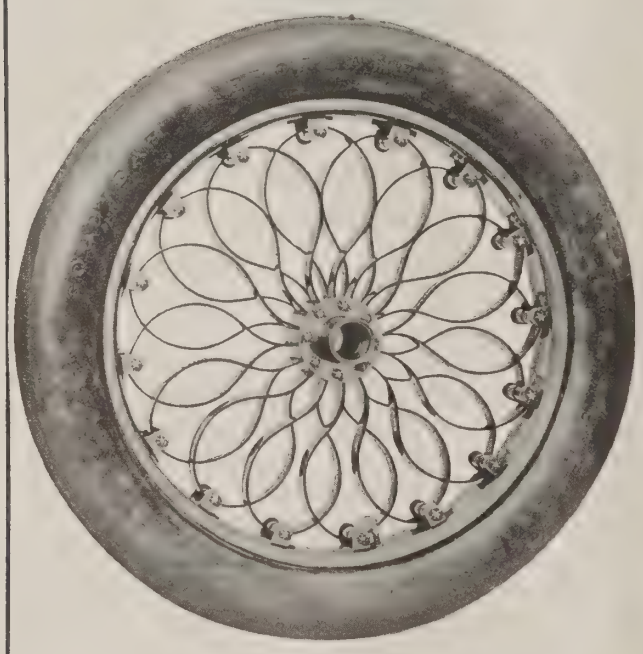
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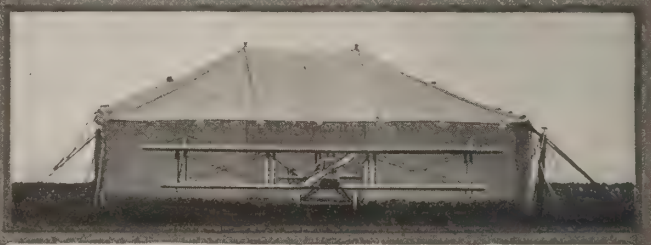
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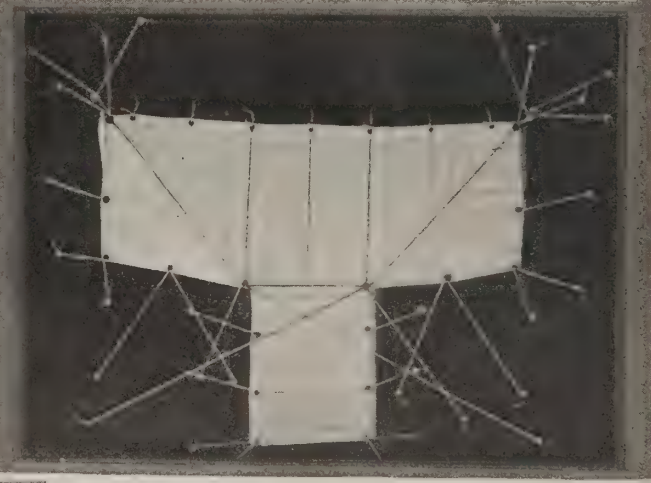
Best of Material and Workmanship.
Fit like the glove to the hand.
Simple as A-B-C



AIRPLANE in hangar. Note room for camp beds at each side under top plane. Front wall closes on cable at top and lashes in center. Non-detachable pegs at bottom make it wind and rain proof.



BALANCE of power for wind resistance through double crossed guys removes strain from any one point and insures perfect safety in storms.



CAREFUL tests of canvas strength have proven the value of rope reinforcement. The heavy guys shown are built into the hangar

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FIRE—AUTOMOBILE—TORNADO—EXPLOSION—RIOT AND CIVIL COMMOTION

(*Continued from page 939*)

W. Evitt, Dudley Miller Outcalt, George Lyon Nicol, Walter B. Dudley, William V. Marshall, Edgar A. Rogers and John Humphrey Small, Jr.

To be captains, Air Service: Jesse A. Johnson, Paul Earl Palmer, Clarence Roy Sigwalt, Joseph W. Hughes, George W. Clayton, George Arnold, Clarence A. Phillips, Ralph Estes Whittle, Lewis A. DeVore, John Francis Bligh, Burt Alfred Skellan, John K. Hampton, Colin Alfred Campbell, William Andrew Gray, George H. Bryan, Russell Bonner Kirby, Jr., Henry T. Hale, Harold Von Thaden, Kenneth MacKenzie, George Wilson Dodds, William Millard Hamilton, Clarence Berry Mitchell, Richard Howard Randall, Charles L. Hayward, John Clifford Bryan, Ralph E. Spake, Vincent K. Butler, Jr., Lesley B. Simpson, Jess Fry, Jr., Oris Petty Embleton, Ralph H. Mosher, Edwin Moseley Sampson, Hilton W. Long, Gerliss C. Moseley, William H. Y. Hackett, Frank A. Ayer, William Lentz and John James Elliott.

To be majors, Air Service: Warren P. Munsell, Frederick W. Zinn, Fred W. Sizer, Arcemus Carter, Andrew B. Hawkins, Robert George Bloedel, Henry Capron White, Veon Irwin Moncrieff, Thomas J. Leary, Harry O. Payne, Gustav Vordtriede, Vardra Magbee Hallman, Jr., Charles C. Merz, William A. Dickema and John Gordon Rankin.

To be lieutenant colonel, Air Service: Frederick J. Ostermann, John Hamilton Jouett and William B. Wynn.

To be colonel, Air Service: Olan C. Aleshire.

The following-named officers will proceed to Plattsburg Barracks, N. Y., and report in person to the commanding officer, United States Army General Hospital No. 30, that place, for duty: Franklin E. Allen, Ralph D. McLaughlin and John Sunderland, Jr.

The following-named second lieutenants, Air Service (Aeronautics), will proceed from Washington, D. C., to Souther Field, Americus, Ga., and report in person to the commanding officer for duty: Samuel W. Dunford and Paul G. Peik.

The following-named second lieutenants, Air Service (Aeronautics), will proceed from Carlstrom Field, Arcadia, Fla., to Souther Field, Americus, Ga., and report in person to the commanding officer for duty: Robert T. Cronau and John A. Wyatt.

The following-named officers will proceed to Washington, D. C., and report in person to the Director of Purchase, Storage and Traffic for duty with the Director of Finance: Fred J. White and Bernard F. Bockenfeld.

Capt. John A. Macready will proceed by aeroplane to Bolling Field, Anacostia, D. C., and upon completion of the duty enjoined, will return by rail to his proper station, Dayton, Ohio.

Maj. Dean Smith will proceed by aeroplane to Bolling Field, Anacostia, D. C., and upon the completion of this duty will return by rail to his proper station, Dayton, Ohio.

Second Lieut. Herbert E. Metcalf will proceed to San Francisco, Cal., and report in person to the General Superintendent Army Transport Service for transportation to Fore Island, Pearl Harbor, Honolulu, Hawaii, by the first available transport. Upon arrival in Hawaii he will report in person to the commanding general Hawaiian Department for duty with the 6th Aero Squadron. Lieut. Metcalf will apply to the Chief of Transportation, Munitions Building, Washington, D. C., for accommodations for so much of the journey as requires water transportation.

The following-named officers, Air Service, will proceed to Fort Sam Houston, Tex., and report in person to the commanding general Southern Department for assignment to duty: Joseph H. McCulloch, Harold C. Block, Edgar A. Liebhouser, Philip Rozelle and Sidney L. Wheaton.

Christopher A. Reid will proceed to Montgomery, Ala., and report in person to the commanding officer aviation repair depot for duty.

First Lieut. Homer Rogers will report in person to the Director of Purchase, Storage and Traffic, Washington, D. C., for duty with the engineering and standardization branch.

First Lieut. Frederic Hamilton Thorne will proceed to Mineola, Long Island, N. Y., and will report by letter to the Director of Air Service, Washington, D. C.

First Lieut. Henry W. Isbell will proceed to Ellington Field, Houston, Tex.

Capt. Charles H. McDonald will report in person without delay to the Director of Air Service, War Department, Washington, D. C., for duty as legal adviser to and as a member of the Air Service Claims Board.

Second Lieut. James Pratt Hodges will proceed to Langley Field, Hampton, Va.

First Lieut. James Henry Sullivan will proceed to Washington, D. C., and report in person to the Director of Air Service, for duty.

First Lieut. Ernest P. Haley will proceed to Fayetteville, N. C., and report in person to the commanding officer Pope Field, Camp Bragg, for duty.

Second Lieut. Matthew E. Finn will proceed to Carlisle, Pa., to the commanding officer United States Army General Hospital No. 31 for duty.

First Lieut. Hiram E. Wilson is assigned to duty with the Committee on Training Camp Activities, and will report in person to the commanding officer March Field, Cal., for assignment to duty as athletic officer.

Leave of absence for 10 days is granted First Lieut. Carl E. Royer, Air Service (Aeronautics).

Second Lieut. Percy H. Heron is transferred to Walter Reed General Hospital, Washington, D. C., and will report in person to the commanding officer that hospital for further observation and treatment.

Second Lieut. Theodore J. Lindorff will proceed to Washington, D. C., and report in person to the Director of Air Service for duty.

Second Lieut. Thomas A. Stratton will proceed to Hazelhurst Field, Mineola, Long Island, N. Y., and report to the commanding officer at that camp for discharge.

First Lieut. Harry C. Colburn is announced as being on duty requiring him to participate regularly and frequently in aerial flights from December 2, 1917, to May 11, 1918.

Second Lieut. Henry G. Woodward will proceed to Bolling Field, Anacostia, D. C.

First Lieut. Charles C. Cook will proceed to Washington, D. C., and report in person to the Director of Air Service for duty.

Second Lieut. John Henry Gardner will proceed to Souther Field, Americus, Ga.

Second Lieut. Kenneth B. Wolfe will proceed to Souther Field, Americus, Ga.

Second Lieut. Arthur Anthony Sego, Aviation Section, Signal Corps, is announced as on duty requiring him to participate regularly and frequently in aerial flights from August 26, 1918, to September 12, 1918.

Capt. Edward W. Rucker, Jr., will proceed to Boston, Mass., and report in person to the commanding general Northeastern Department for duty in the office of the department Air Service officer.

Second Lieut. Harold R. Wells will proceed to Fort Omaha, Nebr., and report in person to the commanding officer Army Balloon School for duty.



Some Notes On Engine Running

(*Continued from page* 933)

Sudden failure to fire (all cylinders)	Complete failure of fuel supply	Fuel pipe broken. Fuel tap closed by vibration.
	Complete failure of ignition	Connection to distributor broken. Distributor brush broken. Lead from magneto to switch in contact with "earth." Complete failure of magneto.
"Popping" in carbureter	Weak mixture	Air leaks in induction pipes. Carbureter jet too small. Failure of gasoline supply due to choked jet. Gasoline tap partly closed by vibration. Insufficient pressure in petrol tank.
	Water in fuel system	Condensation or water in gasoline cans (gasoline should be filtered through chamois leather.)
	Inlet valve sticking	Dirty or damaged valve stem. (*See above.*)
	Exhaust valve sticking	*See above.* In stationary engines, this will result in contact between hot exhaust gases and incoming mixture.
	Weak valve spring	(Renew.)
	Incorrect timing	Too much overlap.
Overheating	Weak mixture	As above.
	Failure of lubrication	Leaks in oil system. Choked pipes or filters. Oil too hot. Insufficient oil. Oil pump failure.
	Spark too far retarded	
	Failure of water circulation	Leaks in water system. (Inspect all joints.) Piping, jackets or pump clogged with sediment and scale. Failure of water pump. (Impeller loose on spindle—broken impeller.)
	Loss of compression	Worn or damaged piston rings. Worn or damaged obturator rings. Look for "blueing.") renew.) Leaky plugs. (Fit new washers or renew.) Gudgeon pin loose resulting in scored cylinder.
Knocking	Pre-ignition	Overheating (as above) causing particles of carbon deposit, spark plug points, or exhaust valves to become hot enough to ignite the charge during compression. In the absence of actual incandescence, acute general overheating may result in spontaneous ignition.
	Spark too far advanced	
Vibration	Engine out of balance	In rotary engines, a new cylinder incorrectly fitted or of incorrect weight. In stationary engines a new piston of incorrect weight. Bent crankshaft.
	Part of engine or engine fittings loose	
	Engine mounting faulty	
	Propeller out of balance	
	Propeller or propeller boss loose	
Engine continues to fire after switch has been put in "off" position	Self ignition	Overheating. (*See pre-ignition.*)
	Broken switch circuit	Defective switch, bad "earth" connection or broken leads to switch.
Smoky Exhaust	Overlubrication of cylinders (bluish grey smoke)	
	Mixture too strong (black smoke)	Carbureter flooding due to punctured float, worn or damaged needle, or dirt on valve seating. Jet too large. Air intake gauze choked. Air pressure excessive owing to failure of relief valve.

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Enemy Tried to Get American Radio Secrets

Washington.—The War Department made public recently a captured German document showing the importance the enemy attached to salvaging our aeroplane wireless apparatus of the "continuous or undamped wave type." The document is also looked upon as indicating that the Allies had progressed further than the Germans in the radio equipment. It reads in translation:

"XIII. (Wurtemburg) Army Corps, H. Q., Corps Headquarters, 5-6, 1918. Routine Order No. 30.

1. (1s) Captured aviation W. T. fittings.

"The enemy has found it possible to use wireless installations for undamped waves in his aeroplanes. So far few fittings of this type of apparatus have been captured by us, and in order to enable us to make use of this as soon as possible and also so as to save millions, which would have to be spent in experiments, it is everyone's duty to see that all W. T. fittings from captured aeroplanes are salved as completely as possible. Even the smallest pieces will be collected as a tyro cannot recognize the value and importance of small parts to the expert.

"W. T. fittings which have been salved will be forwarded to the nearest aircraft unit, which is responsible that they are sent on immediately to the commander of aviation.

"In view of the importance of these fittings for our own wireless telegraphy, sums paid for salvage will be high."

The surprising efficiency and success of Allied radio equipment caused strenuous efforts on the part of the Germans to capture samples of our equipment.

Seventy-fourth Aero Squadron on Coast Defense Duty

Washington, D. C.—According to a statement issued by the Director of the Air Service, the 74th Aero Squadron, organized at Langley Field, Va., to utilize 20 De Haviland aeroplanes in connection with the coast defense, will carry on aerial adjustment of artillery fire for the coast artillery batteries stationed at Fort Monroe, and will adjust on floating targets as far as 20 miles out. These planes have been turned over to the squadron and will be assembled by Air Service recruits.

The squadron will maintain regular practice surveillance patrols over this section of the coast, when operating with the artillery, a system of finding the target and destroying immediately by the rapid adjustment of artillery fire by wireless.

The 74th Aero Squadron is commanded by Capt. Cleaton Reynolds, who commanded the 104th Aero Squadron in San Mihiel and the Argonne offensive.

Operations will be directed by Capt. Frazier Hale, who was the operations officer for the Air Service of the Fifth Army Corps at San Mihiel and the Argonne.

Liaisqn will be conducted by Capt. H. M. Gallop, who also commanded an active service squadron in France.

As it is proposed to establish a brigade of Railway Artillery near Fort Monroe, this squadron will also operate with this extra heavy artillery.

Souther Field Secures Recruits By Clever Campaign

Souther Field, Va.—In order to create interest in the Air Service on the part of enlisted men, Lieut. Floyd A. Wilson, personnel adjutant and publicity officer, has issued an application to all enlisted men at the field, calling for the following information: Name in full, name of daily paper at his home town, and whether he desired a flight.

If a cross-country is planned to any such town, the enlisted man is taken as passenger to his home town, the local newspaper is wired and a reception prepared for the man's visit, thereby creating sufficient interest to cause a 32 per cent increase in the enlistments at Souther Field.

Foreign Service Roster

In completing the War Department foreign service roster, beginning with January 1, 1917, and for future computations, service in Alaska, China, Hawaii, Mexico (Punitive Expedition 1916 and 1917), Panama, Philippine Islands, service with Porto Rico Regiment of Infantry outside limits of United States, service overseas with all American Expeditionary Forces and service when attached to foreign armies in actual campaigns, will be counted as foreign service.

Foreign service will be counted from date of departure from continental limits of the United States of America to date of return, both dates included. It is directed that all officers of the Army be guided by the above, but that this is not to be construed as in any way modifying the foreign service roster in effect up to end, including December 31, 1916.

Aeronautics

AUG 4 1919

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The Heart of Detroit, As Seen From An Aeroplane

Curtiss Company Purchases Atlantic City Airport

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CURTISS COMPANY PURCHASES ATLANTIC CITY AIRPORT

FINDING that the organization of the extensive pioneer aeroplane tours, and similar pioneer constructive activities need his entire attention, Mr. Henry Woodhouse, the founder and owner of the Atlantic City Airport, has accepted the offer of the Curtiss Aeroplane and Motor Corporation and has sold the Airport to the Curtiss Company. As the first Airport and Municipal Flying Field, the Atlantic City Airport has achieved world prominence during the past four months since Mr. Woodhouse created and established it. At the time there was no civilian flying and it was generally stated that aviation activities could not be started this year. And it was feared that by next year public interest would die out and the aircraft industry would die of starvation. Mr. Woodhouse was almost alone in his belief that civilian aviation activities would begin as soon as a flying field was made available and events were organized to enable those interested in flying to participate actively. He presented the idea to many people and organizations and was called visionary. Then he decided to prove the soundness of his plan at his own expense. In two months he organized the Aeronautic Convention and Aerial Contests held at Atlantic City in May and established the Atlantic City Airport. He also organized the extensive series of important scientific and practical aerial tests and demonstrations conducted at the Airport during the past two months and started an entirely new epoch in aeronautics.

So important were these demonstrations that thirty countries sent their representatives to witness them and the Airport has been the meeting place of international aeronautic experts ever since.

The Airport became the mecca of aviators, civilian and military. They arrive at the Airport daily from different parts of the country, put up overnight or stay a few days and participate in tests and demonstrations and then proceed on.

The first aeroplanes bought by civilians since the war, with two exceptions, were bought for the Atlantic City activities, for passenger carrying, intercollegiate contests and pleasure flying. Today these are not less than five hundred individual aeroplane owners and the manufacturers cannot fill the orders fast enough. It is estimated that two thousand planes could be sold this summer if the manufacturers could deliver them. The Curtiss Company has sold 132 one hundred H. P. biplanes of the type known as "Orioles," which made its initial flight from Mineola to Atlantic City on May first in a storm, for the opening-day celebrations of the Second Pan-American Aeronautic Convention and Exposition, and was the first plane to arrive at the Airport. It carried Mr. Victor Hugo Barranco, the representative of President Menocal of Cuba, who brought a message from the latter to be read at the Convention.

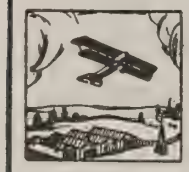
Many of the owners of these aeroplanes have signified their intention to participate in the aeroplane tours which are to start at the end of August or in September, and are to extend south as cold weather comes.

To begin with, the tours will be divided into four classes, as follows: (1) One-day tours for people who can only spend one day a week; (2) week-end tours, which will last from Friday to Sunday or Monday, for people who can only spend their week-end; (3) "Vacation Week Tours," which will last one week for people who wish to spend a week of their vacation in aerial touring; (4) three thousand mile tours, which will last ten days, for the people who wish to spend two weeks of their vacation in aerial touring. One of the aims of the tours will be to open airways for air travel, and establish supply stations throughout the country for air travellers.

The average travel for one day in these aerial tours will be 250 miles, which is less than four hours in the air, so as to afford plenty of time each day for aerial tourists to "take in" other diversions, such as tennis, golf, swimming, motoring, riding, etc., wherever they stop. Expert mechanics, spare parts, fuel and supplies will be provided at the stopping places, where necessary repairs will be made, tanks filled and aeroplanes attended to at the lowest possible charges.

Every effort will be made to create a market for the surplus Army and Navy aeroplanes, motors, accessories, and aeronautic materials. The Atlantic City Airport, the world's first Airport, is located in the heart of Atlantic City, where approximately 15,000,000 people come each year from every part of the world. It is the first municipal flying field in the world and the official flying field of the Aero Club of America, the Aerial League of America, the Pan-American Aeronautic Federation, the Atlantic City Aero Club, and the National Aerial Coast Patrol Commission. It is the center of intercollegiate aerial contests, aerial shooting contests and scientific demonstrations and tests. It is the only place in the world affording facilities for land and water aeroplanes practically in the heart of the city. It is also the only flying field in the world having five and ten kilometer courses marked with regulation high towers as required by the International Aeronautic Federation for testing the speed of aircraft and for aircraft contests. The Airport is located in the heart of the city and has the riparian rights on the thoroughfare, which affords a fine location for hangars for seaplanes. It covers the entire section of Atlantic City which is known as Chelsea Heights, and has a frontage of 3,400 feet on Albany Avenue, with a frontage of 3,400 feet on South Boulevard. The entrance to the aviation field is only 2,000 feet from the Boardwalk and four minutes by automobile from the Atlantic City Railroad Station, with railroad siding within 300 feet of the Airport entrance and cranes for unloading aeroplanes and motors. It has a water main, and electric current and suitable police and fire protection. The value of the land of the Airport is set at over half a million dollars. The negotiations were conducted on behalf of the Curtiss Company by Mr. W. W. Mountain, Vice President and General Manager, and Mr. J. W. Forse, secretary of the Curtiss Company. It is understood that the Curtiss Company have plans for extensive activities to be conducted at the Airport, and a statement regarding the plans is to be issued by Mr. W. W. Mountain.

Mr. Woodhouse is to have the use of the Airport for the Aeroplane Tours, Intercollegiate Contests, Aerial Shooting Contests, and scientific tests and practical aerial demonstrations. Mr. Mountain has stated that one hundred thousand dollars will be spent to improve the Airport and make it "The World's Aeronautic Show Window."



The News of the Week



Curtiss Plane Breaks American Altitude Record

Mineola, L. I.—According to information from the Curtiss Engineering Company, the American altitude record was broken on July 25 by Roland Rohlfs, test pilot for the corporation, who in one of the new Curtiss "Wasps" reached a height of 31,100 feet. The record has not yet been homologated by the Aero Club authorities. This is 2,200 feet better than the record made last year by Major R. W. Schroeder, U. S. A., who in a British-built Bristol with a Hispano-Suiza motor attained an altitude of 28,900 feet. The French aviator Casale, in a Nieuport, is credited with an unofficial record of 33,100 feet.

The machine Rohlfs flew is a triplane designed and built as a pursuit machine for the United States army. It is equipped with the new 400-horsepower Curtiss motor and under government tests has attained a speed of 160 miles an hour.

Martin Bomber Starts on Flight Around Country

The Martin bomber, carrying a crew of five, commanded by Lieut. Col. R. S. Hartz, left the ground at Washington at 10 A. M., July 24, on the first leg of a flight of nearly 8,000 miles around the rim of the country.

The flight is the longest ever attempted by the Army Air Service, and will carry the machine through thirty-one States, over ninety-five cities, and cover long stretches of the Atlantic, Pacific, and Gulf Coasts, as well as the Canadian border.

Lieut. Col. Hartz was accompanied by Lieutenants Ernest E. Harmon and Lotha A. Smith as reserve pilots, and Sergeant John Harding, Jr., mechanic, and Jeremiah Tobias, master electrician. The big machine rose from Bolling Field, circled the White House in low flight then headed away on its course.

The general line to be followed will carry the machine in order to Duluth, Minn.; Seattle, Wash.; San Diego, Cal.; San Antonio, Texas; Miami, Fla., and back to Washington. The actual measured distance of the route is 7805 miles.

The time for the first lap of the journey from Washington to Mineola, a distance of 200 miles, was made in 145 minutes. Water and oil leak developed over Baltimore. Master Electrician Jeremiah Tobias walked out on the wing and fixed the same, photographs being taken of the work.

On July 25, the machine left Mineola at 8:25 A. M. and reached Augusta, Me., at 1:05 P. M., making a perfect landing on the State muster grounds.

Lieut. Col. R. S. Hartz, on July 26, resumed his flight in a Martin bombing plane around the rim of the United States, after four hours' delay on account of engine trouble.

The plane rose at 11:15 A. M. on what was intended to be a flight of 660 miles to Cleveland, Ohio. After being lost in the air for nearly three hours the army bombing plane landed at Upper Jay, near Lake Placid, burying its nose in the ground. The crew were badly shaken up but none was seriously injured. Lieut. Col. R. S. Hartz stated that the machine would be forced to remain at Upper Jay for at least two weeks to make necessary repairs. In hitting the ground one wheel, damaged in landing at Augusta, broke, swinging the machine completely around.

Bowman Increases Toronto Flight Prize

John McE. Bowman announced that he had increased the prize for the air race between New York and Toronto, and from Toronto to New York, from $5,000 to $10,000. Mr. Bowman offered the $5,000 prize some time ago. The race is to be in the week of August 25, at the time of the Canadian National Exposition.

Fishing from Seaplanes Saves Time

Atlantic City, N. J.—Earle L. Ovington, president of the Curtiss Flying Station at Atlantic City, and Mr. C. W. Forse, secretary of the Curtiss Aeroplane and Motor Co. of Buffalo, started off recently in a Curtiss "'Seagull" for the fishing banks, five miles off the coast here. In less than four minutes the folding anchor had been thrown overboard; in three minutes the first bite was reported; within eight minutes they had caught three fish; four minutes later they were back at the hangar. By boat more than an hour would have been consumed in going to and from the banks. If you value time, use an aeroplane.

Aeromarine Passenger Carrier Makes Speedy Atlantic City Trip

Atlantic City, N. J.—The New York-Atlantic City passenger carrying service, inaugurated by the Travellers' Company of New York City, carried two passengers and pilot from New York to Atlantic City and return between 1 and 7 P. M. The trip down was made in 150 minutes and the return in 78 minutes. The distance is 105 miles.

Those who had obtained booking for the first flight on the seaplane line were Mrs. John A. Hoagland, wife of a baking powder manufacturer, and her friend, Miss Ethel Hodges of Dallas, Tex. They were safely ensconced in wicker seats in the cabin de luxe, which is upholstered in brocaded satin.

In the pilot's seat was Robert W. Hewitt, formerly with the United States Naval Air Forces. The fare is $100 each way and each passenger is permitted to take thirty pounds of baggage. Baggage over that weight will be charged for at the rate of $1 a pound.

The boat, equipped with a 150-horsepower motor, is twenty-six feet long and has a wing spread of fifty feet. C. Nicholas Reinhardt is manager of the new line.



All aboard for Atlantic City on the Aeromarine aerial limousine. Mrs. John A. Hoagland and Miss Ethel Hodges were the first passengers from New York to the coast resort. They were safely piloted there and back by Robert W. Hewitt

Balloonists Meet at Worcester

Worcester.—The pilots interested in ballooning convened in Worcester recently and voted to make Worcester the central headquarters of the Eastern department of balloon aviation. Among those present were J. Walter Flagg, expert balloon pilot, and vice-president of the New England Aero Club; N. H. Arnold, balloon pilot and instructor for an army balloon school, who made several long-distance flights years ago; Lieutenant Joseph L. Batt, instructor at the Fort Omaha Balloon School during the war and in charge of the balloon house; Theodore E. Hedlund, ex-United States war service overseas aviator and president of the Massachusetts Aero Club of Service Aviators, and Ensign Lester P. Dodge, who saw service in the naval plane department.

The airmen voted to procure several balloons and it is hoped to begin flights September 1.

Commutes to Summer Home By Air

Vineyard Haven, Mass.—Week-end commuting by aeroplane received an impetus on July 25 with the completion of a New York-to-the-Vineyard flight by two wealthy summer residents, Melvin B. Fuller and Myron J. Brown, New York business men, and their pilot, C. D. Griffin. Leaving New York at 2:40 P. M. they landed at Oak Bluffs at 5:30 P. M. The flying time was 2 hours, 30 minutes. They made a stop at Cosey Beach, Conn.

Inspecting Balloon School Site at Camp Dix

Officers representing the Federal Balloon Commission are inspecting and mapping out the land in the vicinity of Lewistown, west of Camp Dix, N. J., which will be required for the proposed balloon school—the largest in the United States.

Aeroplane Helps Auto Racer to Victory

Detroit, Mich.—The Bearings Service Company of Detroit received an order from Tommy Milton, driver of the winning Duesenberg car at the Uniontown Races just 24 hours before the race. The front wheel was broken in a trial the day before the race, and a thorough search of Uniontown and Pittsburgh failed to unearth a bearing of the proper size. Train connections being impossible, the Universal Aeroplane Company was called on and a flight of 300 miles was made in 210 minutes, the remainder of the distance being completed by automobile. Repairs were made in time, and Milton and his Duesenberg won the race.



Mrs. H. L. Potter of Madison, Wisc., well known trapshooter and sportswoman, is the first of her sex to purchase an aeroplane for purely pleasure purposes

Ten Planes Fly to Albany

Albany, N. Y.—In command of a squadron of ten aeroplanes, Col. Archie Miller, on July 25, flew from Mineola to the State capitol, in order to deliver reports and recommendations concerning aerial activities for the information of the Governor. The Curtiss H made the trip in 85 minutes and the De Haviland in 70 minutes.

Mexico to Purchase Military Aeroplanes

Washington, D. C.—Ambassador Bonillas, of Mexico, in conference at the State Department on July 17 with Acting Secretary of State Polk and Henry P. Fletcher, American Ambassador to Mexico, renewed his request for permission to purchase aeroplanes and munitions in this country for his government. He said after the conference he believed the request would be granted.

Mr. Bonillas, who has just returned from a month's stay in Mexico City, reported on the progress being made to pacify Mexico.

First Woman Pleasure Flyer

Mrs. H. L. Potter, of Madison, Wis., has the distinction of being the first woman in the world to purchase an aeroplane for pleasure flying.

Ruth Law and Katherine Stinson have been flying for several seasons but they have taken up aviation as a commercial proposition.

Mrs. Potter purchased a Curtiss JN-4D from George W. Browne, Curtiss distributer for the Middle West, and she has been using it on shopping tours between Madison and Milwaukee and Chicago.

She is one of the best trap-shots in the country, attending all the tournaments in the West and she will use her plane as a means of transportation this summer.

Lt. Robert Connelly, formerly of the U. S. air service, has been engaged as pilot and will teach Mrs. Potter how to fly.



The twin-motored Loughead flying boat ready for service at Santa Barbara, California. It carries fuel for a 450 mile trip with ten passengers

Rockaway Plans Shaft to Mark NC-4 "Hop Off"

A meeting of the Rockaway Civic League took place at the Belle Harbor Yacht Club to form an organization to raise a fund to erect a monument to commemorate the flight of the NC-4 across the Atlantic.

T. Burke McGuire was elected chairman and tentative plans were formed for a national appeal for funds. It is proposed to place a shaft at the spot where the NC-4 "took off" at Rockaway Point.

Many Entries in New York-Toronto Flight

New York, N. Y.—A large number of aviators have signified their intention of entering the New York-Toronto contest. On the American side are Col. H. E. Hartney, United States commander of the Third Pursuit Group of fighting aeroplanes at the front; Lawrence A. Sperry, inventor of the aeroplane automatic gyro stabilizer; Capt. James S. Foote, Government instructor; Major William S. Schroeder, altitude record holder; Lieut. W. H. Murray, the English fighting pilot; Capt. George Traill, attached to the British Air Ministry in the United States; Capt. Paul Baer, the famous American ace, who was captured by the Germans after being shot down twice and who later made his escape in a German aeroplane; Roland Rolf, the crack Curtiss test pilot; Capt. Edward Green, an ace of the famous Lafayette Escadrille, composed of American fliers who joined the French air service before the war came our way; Edward Stinson, United States Government instructor and test pilot; H. C. Ferguson, famous American test pilot at the mammoth aviation center at Issoudin, France, during the great war; A. B. Gaines, Col. James G. Vincent, vice-president of the Packard Motor Car Company, who was one of the designers of the Liberty motor; Howard A. Rinehart, of the Dayton-Wright Aeroplane Company, famous as a test pilot for Orville Wright and holder of numerous cross-country records.

Among the Canadians who will enter the contest are Col. W. A. Bishop, V. C., D. S. O., and Col. Barker, V. C., both famous Canadian aces, together with Capt. William Younghusband and F. G. Ericson. Col. Barker has already been testing out a number of German Fokker fighting machines which were brought down intact at the front during the war. He had an arm shot off during an aerial battle with a squadron of Hun fliers. He has a record of bringing down thirty-six German machines. Col. Barker is to have the distinction of flying with the Prince of Wales to show the latter how the city of Toronto looks from an aerial viewpoint.

Dirigible Accident in Chicago

Chicago, Ill.—Eleven persons were killed and twenty-seven injured when an exhibition dirigible from a Chicago amusement park caught fire over the business district and plunged through the roof of the Illinois Trust and Savings Bank Building. After flying over the city for several hours, flames were seen to burst out through the top of the blimp's envelope. Four of the five occupants of the craft jumped with parachutes and two made safe landings, one being fatally injured in striking the ground, and the fourth being overtaken by the flaming craft and carried with it through the roof of the bank building. Instantly the entire building appeared to be in flames and the gasoline tanks were heard to explode. Nine of the bank personnel were killed as a result of the fire.

The cause of the accident has not been determined. It may be that the bag burst from the heat and sparks from the exhaust caused the fire to start. The manufacturers of the dirigible have agreed to pay all damage resulting from the accident.

Wed by Radio Telephone Aboard Aeroplane

Matrimony in the air was a feature at Speedway Park, Sheepshead Bay, on July 26, at the second Police Field Day, when Miss Milly K. Schaefer, daughter of Mrs. Katharine Schaefer, of Sea Gate, became the aeroplane bride of Lieutenant George H. Burgess, U. S. Air Service, flying at an altitude of 1,000 feet, with an assembly below of 200,000 spectators. The first real sky pilot married the couple through the use of the radio telephone.

The ceremony was conducted between two United States Army-Curtiss aeroplanes equipped with 150 horsepower motors. The prospective bride and bridegroom flew in one machine, while the minister and best man occupied the second plane.

The ceremony was performed by the Rev. Alexander Wouters, pastor of the Edgewood Reformed Church, Borough Park, Brooklyn. Lieutenant Eugene H. Barksdale, U. S. Air Service, acted as best man, and Miss Doris K. Schob, of Brooklyn, served as bridesmaid. The bride-elect had never been up in an aeroplane.

Oil Magnate Commutes from Denver to Tulsa in Oriole Plane

Buffalo, N. Y.—Mr. I. B. Humphreys, president of the Humphreys Petroleum Co., has purchased a Curtiss three-passenger Oriole biplane for use in traveling between his Denver home and his oil properties located near Tulsa, Okla. He is forced to make the trip several times a month and finds the journey very irksome, requiring thirty-six hours. His new means of travel will enable him to leave his home in the morning and return the same evening. He will return to Buffalo in August to secure a second Oriole which he will use in a passenger-carrying service over the mountains to Estes Park and Colorado Springs.

Two Ex-R.A.F. Officers Will Take Long Trip in Curtiss "Seagull"

The longest flight undertaken by civilian flyers in a flying boat since 1914 will start from New York early next month, when S. E. Parker and G. Talbot Willcox, former Majors in the Royal Air Force, will set out for New Orleans by the inland water route. They may continue their flight around the Gulf of Mexico to Panama and South America.

They will make the trip in a Curtiss "Seagull," equipped with wireless telephone and telegraph. Heading up the Hudson, they will stop at Peekskill, Newburgh, Poughkeepsie, Catskill and Albany. Thence they will fly to Troy, Schenectady, Stillwater, Saratoga Springs, Glens Falls, Lake George, Ticonderoga, Burlington, Plattsburg and Alburg. Their schedule calls for arrival on the St. Lawrence in September. Moving west, they will stop at Syracuse and Oswego, Ontario Beach and Buffalo. From Buffalo the boat will be shipped to Cincinnati, and the route will lie down the Ohio and Mississippi Rivers, arriving at New Orleans in time for the Mardi Gras.

Major Willcox flew in the Dardanelles campaign and Egypt during the war. Major Parker served in France in the 60th British Pursuit Squadron, to which Col. William Bishop, "ace of aces," was attached.

San Diego-San Francisco Flight at 135 Miles An Hour

San Francisco, Cal.—The remarkable time of 272½ minutes (speed 134.22 per hour) made by Lieut. J. W. Sharpnack, in a Liberty motored Le Pere, on July 24, for a distance of 610 miles on a non-stop trip from San Diego to San Francisco, carrying one passenger, has established a record for travel between San Diego and San Francisco. The motor, despite the strain of the flight, was in perfect mechanical condition upon its arrival.



Earle L. Ovington and C. W. Forse, who took a speedy fishing trip in a Curtiss "Seagull"

The AIRCRAFT TRADE REVIEW

N. E. J.

Air Line Between New York and Bridgeport Planned

Bridgeport, Conn.—Bridgeport is ready for the establishment of an air freight and passenger line, as announced in New York by the National Air Service Corporation, which plans to operate an aerial transportation system between New York and Boston with stops in this city and New London. Several months ago the Chamber of Commerce appointed an aviation committee, headed by former army officers. A landing field was selected. This field will be used as a landing place for the air line, according to announcement made here. Two biplanes will be used by the service.

Boeing Completes Navy Order for HS-2L Boats

Seattle, Wash.—The Boeing Aeroplane Co. has completed its contract with the Navy Department for Liberty motored HS-2L flying boats. The order originally called for fifty of these craft, but upon the signing of the armistice, the order was reduced to twenty-five.

Pacific Aviation Company Has Carried 500 Passengers

The Pacific Aviation Company of San Francisco, operating two Glenn Martin type TT biplanes, has already carried 500 passengers in its daily service. More planes are being acquired. B. M. Spencer and S. Purcell, formerly of the Army Air Service, are chief pilots.

On one occasion a vial of serum was delivered from San Francisco by one of the planes of this company in time to save the life of a woman in Marina.

Aircraft Protect $70,000,000 of Western Forest

Washington, D. C.—The Air Service announces that the three sections of forest now being protected by its aerial patrol have a total of 35,000,000,000 board feet of timber valued as follows: Tahoe National Forest, $18,000,000; Stanislaus National Forest, $19,280,000; Eldorado National Forest, $25,000,000. The acreage under direct observation is over 1,636,000. More than thirty fires have been located and put out before material damage was done.

Missouri Ranchmen Buy Curtiss Aeroplane

Boonville, Mo.—Six large Missouri property holders have purchased an aeroplane for the rapid inspection of their holdings. The plane is a Curtiss and has been flown by its pilot, Lieut. Russell Simmons, formerly of the Air Service, from Kelly Field to Boonville. The properties range between three and four thousand acres each, and at least one of them consists of scattered holdings.

Three Aviation Companies Organize in Spokane

Spokane, Wash.—Two aviation companies are in active business and a third in the process of organization in the vicinity of Spokane.



J. L. Justice, who has been appointed General Sales Manager of the National Wire Wheel Works

The Northwest Aircraft Company, this city, has two machines, one of which was designed and constructed by the company's own expert. Both machines have been used for exhibition purposes most successfully, and the company plans to enter commercial aviation on a comprehensive scale.

The latest entry in the aviation field is the Washington Garage in Yakima, which has received two machines from Mather Field, Sacremento. The aviators attached to this enterprise are Lieutenants R. P. Marshall and Floyd L. Kelso, late of the United States Aviation Service. Kelso's mother had never seen an aeroplane, but she flew from Yakima to her home in Kennewick with her son the day after his machine was delivered. The machine will be used for exhibition and instructional purposes. The company will operate an agency for aeroplanes.

The Western Aviation Company of Spokane is another concern from which considerable is expected. The company is understood to contemplate purchasing several aeroplanes in the very near future, and it is predicted that a substantial impetus will be given to aviation locally as a result of its activities.

Hartford Insurance Company Gets Proposal to Insure Passengers

Hartford.—The Travelers' Insurance Company is considering the proposal of an aeronautical company being formed in New York to insure the lives of passengers on dirigibles which it is proposed to operate between New York and South America. A life insurance policy would be sold with each ticket for passage.

The dirigibles would be intended principally for commercial traffic and would carry only a few passengers.

Browne Aerial Express Service Now Operating

The first aerial express line has been inaugurated by George W. Browne, of Milwaukee, Western representative of the Curtiss Aeroplane Corporation and distributer for Willys-Overland, Inc., by two planes of the Browne Aerial Express service.

These planes, carrying a consignment of tires for the Willys-Overland Company at Toledo, from the Federal Rubber Company of Cudahy, Wis., on the outgoing trip and a number of Overland automobile parts on their return, just completed a successful trial trip between Milwaukee and Toledo.

The two planes, piloted by Lieut. Milton Elliott and Lieut. Shirley Short, originally departed from Cudahy, Wis., with their cargoes of Federal tires, stopping at the Browne Aviation Field in Milwaukee. From there they flew to Chicago and thence to Toledo. On the return trip they transported a quantity of Overland parts to the Browne salesroom in Milwaukee.

The Use of Woodtite in Aircraft

The discovery of Woodtite, a scientific product of the Woodtite Laboratories of Modesto, California, has marked a new era in the wood-working industry, particularly the hard wood industry. As an industrial invention none was ever more oportune; first, because of new uses for hard wood under great stran, and, second because the best hard woods are now much scarcer than formerly, thus necessitating more frequent use of inferior qualities.

Woodtite is not a glue. It is an oil-like compound, devised to meet the universal requirements of an agent to swell shrunken wood permanently in all cases of loose joints. It also prevents warpage.

All wood is subject to swelling, shrinkage or warpage from climatic variations, no matter how much care is exercised in seasoning. Constant strain and severe service will also upset the exactness of joining and turning, be the workmanship ever so perfect. Hence the vital need of a neutralizing agent like Woodtite.

Hitherto Woodtite has been used chiefly in a product with the well known trade name of Spoktite for tightening loose wooden automobile wheels. It was an urgent need in this respect that really caused the invention of Woodtite. But now its use has extended throughout the whole wood-working industry. It has been found invaluable in fine cabinet and furniture making, and it is now being tried in aircraft construction where perfect joints in all wood-work is important for stability and permanency.

The Woodtite Laboratories at Modesto, California, have the best chemists and mechanics available, constantly at work on all sorts of tests for wood-work in aircraft and similar construction. They extend advice and the benefits of their researches to all who apply for assistance, without cost or liability to the enquirer. The makers of wooden parts for aircraft are especially invited to avail themselves of this source of co-operation and information.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Cerriden, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative



PILOTS

Dana C. DeHart
Edward V. Gardner
Eber H. Lee
John M. Miller
Leon D. Smith
Max Miller
Charles E. Bradley
Lester F. Bishop
Harold T. Lewis
Leslie E. Stancill
Charles Hugh Anglin
John H. Skoning
Earl F. White
Charles W. Lamborn
Frank H. Crozier
Walter H. Stevens

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

R-34 Mail Arrives Eleven Days Sooner

Copies of New York newspapers of July 7, 8, and 9, the issues which were brought to England by the R-34 and delivered in London on July 13, were distributed through the ordinary steamship mail on July 24, eleven days later.

Curtiss Mail Plane Holds New York-Bellefonte Record

One of the new Curtiss HA mail machines, built by the Curtiss Aeroplane and Motor Corporation for the Post Office Department, recently broke all flying records between Belmont Aerial Mail Station, New York, and Bellefonte, Pa.—one of the legs on the newly completed aerial mail route between New York and Chicago. The journey of 220 miles was made in 105 minutes, including a stop of ten minutes. The previous record was held by one of the De Haviland mail machines. Pilot Stevens, who flew the ship, stated that the machine averaged 120 miles per hour over the course which is, for the greater part, over mountainous country. The HA machine was designed by the Curtiss Company and built around the Liberty Motor. It has a mail-carrying capacity of 900 pounds and, in a test performance, attained a speed of 145 miles per hour with a full load. It has a landing speed of 45 miles per hour.

Aerial Mail Strike Settled

The strike of the aeroplane mail pilots is definitely settled and the mails between New York and Washington and New York and Chicago are arriving and leaving on schedule. The settling of the strike was the result of a conference between six of the striking pilots and Otto Praeger, Second Assistant Postmaster General, in Washington, on July 27.

Headed by Pilot T. H. Anglin, the pilots went to Washington to lay their demands before Mr. Praeger and endeavor to prove to him that pilots with more than 500 hours' experience in the air could be better relied upon to judge weather conditions than the postoffice authorities and could decide when not to fly. The pilots were represented by Attorney James H. Conklin, of Bellefonte, Penn., and included Pilot E. Hamlin Lee, who was dismissed for refusing to take the air in a heavy mist.

Although the details of the conference were not given out, the Postoffice Department authorized a statement that a satisfactory conclusion had been reached and that the strike was the result of a misunderstanding.

The six aviators who refused to fly on July 25 with mail from New York to Washington and to Bellefonte, Penn., and from the latter city to Cleveland have been reinstated. They were dismissed for refusing to obey orders. However, the two pilots, Leon Smith and E. Hamilton Lee, whose dismissal on July 22 was directly responsible for the strike, have not yet been reinstated, it was said, as their cases would require further investigation.

The striking pilots claimed that when Smith and Lee refused to fly, there was a heavy rain and dense banks of mist. Flying under such conditions in the last two months, they said, had resulted in several accidents.

The visibility on July 22, when the aviators refused to fly, was said to be barely 100 yards. The R-4 mail planes drive ahead one and two-thirds miles every sixty seconds. They do not function properly at an altitude lower than 800 feet. Despite the appeals of pilots, they are not equipped with stabilizers, which, in case of fog, would inform the pilot whether he was flying right side up or upside down. The department thought them too expensive, it was said. The pilots said they cost $75.

Under such conditions, the pilots declared, any mail plane which took the air in rain and mist would be driving at a precariously low altitude over cities and villages at the rate of 100 miles an hour.

In reply to these charges Assistant Postmaster General Praeger made this statement:

"My attention has been called to newspaper statements containing charges said to emanate from air mail pilots. These charges, if they were true, are not sincere. They were not made before the dismissal of the two pilots in question and would not have been made if these two pilots had been reinstated or have been permitted to have their own way in the matter of the selection of types of planes to fly the mail.

"Any statement that a Curtiss R-4 plane with a Liberty motor is an unsafe ship is a calumny on our aeroplane industry. The statement that this type of plane cannot be flown at less than one hundred miles an hour is false and the pilots who are supposed to have made this statement know that they have to push the engine almost to its utmost limits of performance to get one hundred miles an hour out of this type of plane; also they know that its lowest flying speed is not in excess of fifty-five miles an hour, as demonstrated at a recent official test by the Air Mail Service. This is possibly five miles an hour more than the small type JN-4-H.

"There is no truth in the statement that the Postoffice Department is refusing to equip planes with gyroscope turn indicators. These instruments are in course of further development and refinement and are not obtainable in quantities on the market as yet. The indicators for the air mail service which are being developed will require two months' further work. The indicator will have to be further perfected, and this is what the Postoffice Department expects to accomplish.

"The department, however, cannot leave the question of when to fly and when not to fly in each instance for the judgment of a dozen different aviators. If this were done, it would be impossible to operate a mail schedule with any degree of dependability and the air mail would have to be abandoned."

First Aerial Trans-Atlantic Express Package on Display

New York, N. Y.—The shipment of platinum which was brought over by the great British dirigible R-34—the first ever to make the aerial passage—is now on exhibition in the window of Dreicer & Co., the Fifth Avenue jewellers.

The company announces that this precious consignment will be made into medallions commemorating the historic bridging of the Atlantic by the lighter-than-air type of aircraft.

New Bellefonte-New York Record

A record flight of ninety minutes from Bellefonte, Pa., to New York, on the last leg of the Chicago-New York route, was made by Pilot Stevens, who arrived at Belmont Park, L. I., at twenty-seven minutes before one o'clock on July 26, following the resumption of aerial mail service after the recent strike.

Aerial Weather Bulletin Issued

Washington, D. C.—The twice daily aerial weather bulletin is now being issued by the Air Service at all army flying fields, forecasting the conditions for flying for twenty-four hours, from 9:30 A.M. and 9:30 P.M. The country has been divided into zones, and the flying fields within each zone will receive the reports covering their locality. In addition, a special report will be telegraphed on request covering flights between the points named in the request, which should state the time of the contemplated start.

Daily observations at various altitudes will be taken by the Balloon Division at the following points: Arcadia, Fla.; Fort Omaha, Neb.; Akron, Ohio; San Antonio, Tex.; Hampton, Va., and from the aeroplane at Arcadia, Fla.; San Diego, Cal.; Allessandro, Cal.; Sacramento, Cal.; Rantoul, Ill. Houston, Tex.; Americus, Ga.; Washington, D. C.; New York, N. Y.

The data obtained will be handed the Weather Bureau and used in connection with reports received by them to aid the aerial forecast.

THE DE HAVILLAND AEROPLANES

The D.H. 1

A FEW months before the outbreak of war the Aircraft Manufacturing Co., Ltd., or, as the firm is now styled, the Airco., were fortunate enough to secure the services of Mr. (now Capt., R.A.F.) Geoffrey de Havilland, who had up till then been engaged as designer at the Royal Aircraft Factory (now Royal Aircraft Establishment) at Farnborough. The first machine designed by Mr. de Havilland for the Airco, made its appearance early in 1915. It was a two-seater of the pusher type, and during the preliminary trials, piloted by its distinguished designer, the machine gave promise of very good qualities, judged by the standard of those days. Although originally designed for a more powerful engine, the D.H. 1 had a very good turn of speed for its power—the engine fitted was a 70 H.P. Renault—and was inherently stable to a very great extent, de Havilland flying it repeatedly "hands off." The D.H. 1 had its seats so arranged in tandem that the gunner was in the front seat. The pilot sat behind the gunner and his seat was placed somewhat higher.

The D.H. 1A

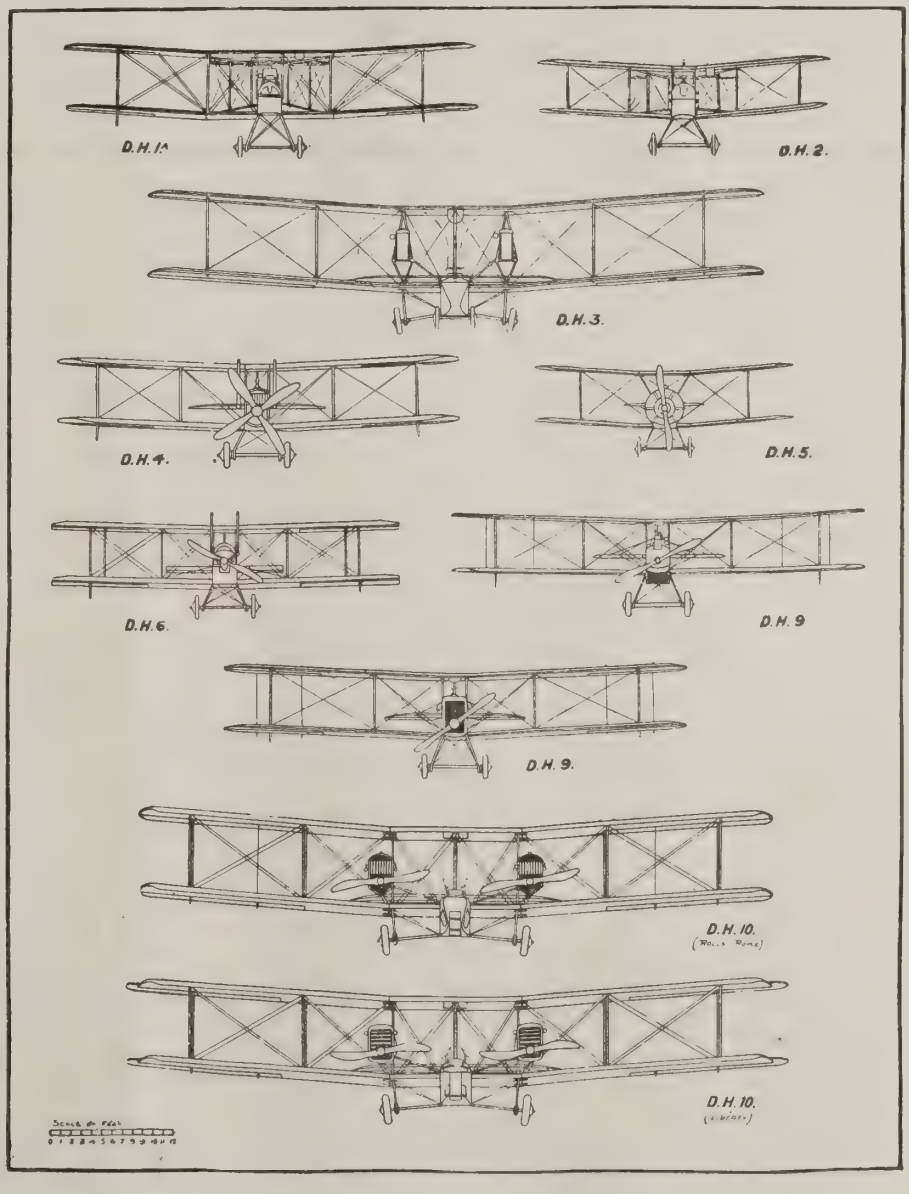
The D.H. 1 was followed by the D.H. 1A, which was practically identical, except that it was fitted with a 120 H.P. Beardmore engine. On the D.H. 1 the shock-absorbing arrangement consisted of coil springs taking the load, while the rebound was taken by a piston working in a cylinder filled with oil. This arrangement was discarded in the D.H. 1A for the ordinary rubber shock absorbers. Another experiment which was tried on the D.H. 1 was discarded in D.H. 1A, namely, the air brakes. These consisted, in D.H. 1, of two small monoplane wings, each of some 3 ft. span, mounted on the top longerons of the nacelle. In normal flight these wings were set at no angle of incidence, but for landing they could be rotated so as to present an area normal to the direction of flight. They were not a great success, however, and were not incorporated in D.H. 1A. To preserve the clean appearance of the nacelle, the radiator was not mounted on the sides, but was built into the front portion of the engine housing, just behind the back of the pilot. In addition to providing the cooling, this placing of the radiator may possibly have assisted materially in keeping the pilot warm. The performance of D.H. 1A was very good for its power, the speed being 89 M.P.H., and the climb to 6,000 ft. taking 12 mins. 10 secs.

The D.H. 2

After the D.H. 1A came a little machine which startled everybody by what was in those days considered fine speed, and, especially, an excellent climb. This was D.H. 2, a little single-seater pusher scout with 100 H.P. Gnome monosoupape engine. When D. H. 2 came to be turned out in quantities it soon became a favorite for certain classes of work, and was used with great success on the Western front in the days before synchronized machine guns became the fashion. When this happened, the *raison d'être* for the pusher disappeared, and as this type could not be got to do the performance of tractors with the same power, it gradually ceased to be used. For comfort in flying, however, it is doubtful whether this type can be surpassed. There is no slip stream, and placed as he is in the extreme nose, the pilot can be seated low down and well protected from the wind, which, as a matter of fact, is only felt on a turn. The theory held at one time that this type is dangerous on account of the engine being behind the pilot is not, we think, borne out by experience, and we are not by any means certain that for pleasure flying the now rather despised pusher should be regarded as a thing of the past. As far as the Airco. is concerned, the D. H. 2 was their last single-engine pusher.

The D.H. 3

While thus engaged upon the production of small pusher scouts, Capt. de Havilland foresaw the need for larger weight-carrying machines, and designed a twin-engine machine which became known as the D.H. 3. It was a fuselage biplane with the engines placed between the planes and the fuselage placed rather low down. The latter feature somehow gave the machine an appearance of being, as someone put it, "a flying-boat on wheels." The accommodation of the occupants—the D.H. 3 carried three—was designed with a view to giving the two gunners—or bomb-droppers—a good view in all directions. The front gunner's cockpit was in the extreme nose of the fuselage. The pilot occupied the middle seat, and the rear gunner's cockpit was placed well back, clear of the trailing edge of the planes. The engines, two Beardmore 120's, were mounted on Vee struts between the wings, and drove, through an extension of the shaft, the pusher screws, which both revolved in the same direction. The tank capacity was sufficient for a flight of eight hours' duration, and as the military load was 680 lbs., the machine should have been quite a useful bomber, especially as her speed was 95 M.P.H. at low altitudes and only dropped to 88 M.P.H. at 9,500 ft. It might be mentioned that the body of the D.H. 3 was covered with three-ply wood, which

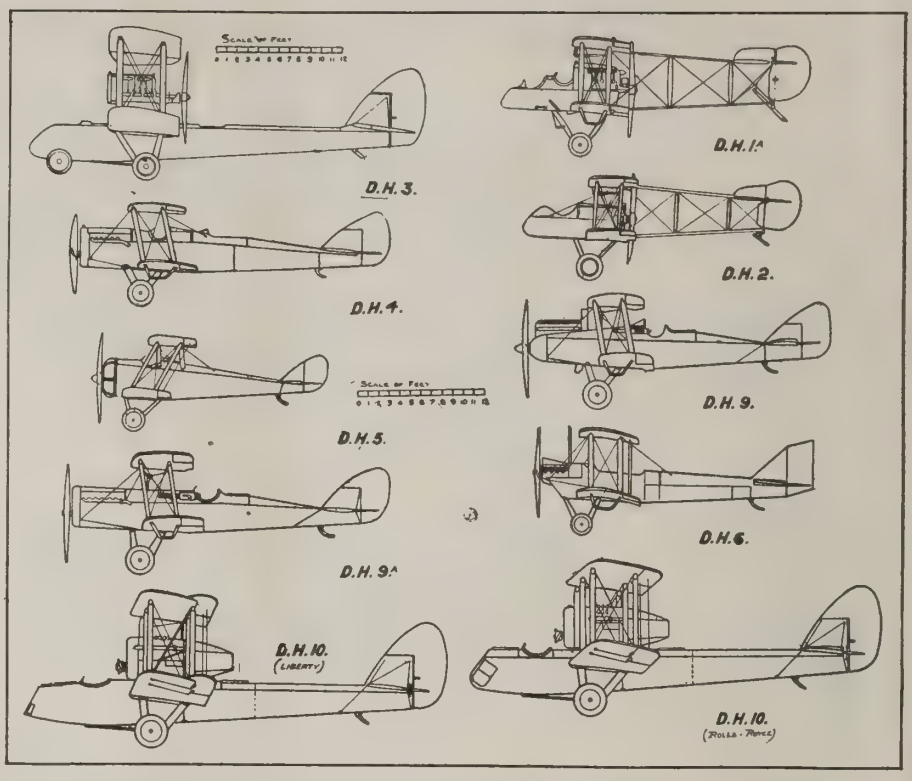


Front views of the De Havilland aeroplanes

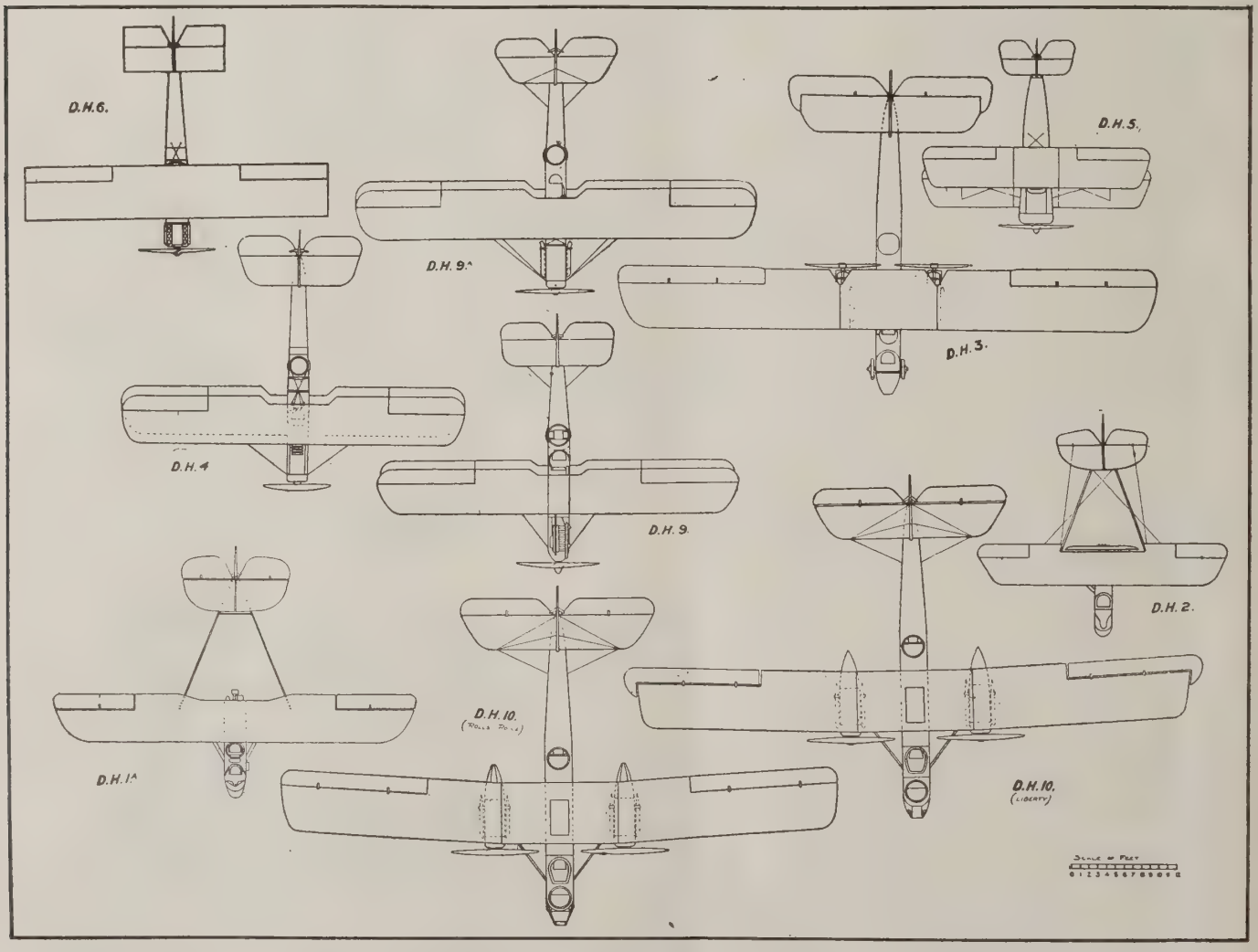
further tended to make her resemble a flying-boat.

The D.H. 4

The next design to leave the drawing table of Capt. de Havilland was a two-seater tractor, D.H. 4. The power of the engine available had by then increased considerably, and it was possible to hope for much better performances from two-seaters than had hitherto been the case. This was the object of the D.H. 4. So as to give the gunner a better chance to use his machine-gun, his seat was placed far aft in the body, where he is well clear of the wings. The first D.H. 4 to make its appearance at Hendon was fitted with a B.H.P. engine of about 200 H.P., but later on engines of other makes were installed with great success. An examination of the accompanying tables will show the performance of the machine with the various engines that have been fitted from time to time. The high efficiency of the D.H. 4 has enabled the Royal Air Force to use it for nearly every purpose for which aeroplanes are used. It has done long-distance reconnaissance, bombing, photography, fighting, etc., and has also been extensively used for long-distance passenger carrying. According to the engine fitted the machine has varied a little from time to time, but the alterations have not been great. For instance, some D.H. 4's have had their exhaust collectors swept upwards so as to carry the fumes away



Side views of the De Havilland aeroplanes



Plan views of the De Havilland or "Airco" aeroplanes

Table of dimensions of "Airco" machines.

Type of machine.	Length o.a.	Wing span.		Wing chord.		Wing area.*			Incidence.		Gap.	Stagger.	Sweepback.	Dihedral.		*Aileron* area.	Area.			Area.		
		Top.	Bot.	Top.	Bot.	Top.	Bot.	Total.	Top.	Bot.				Top.	Bot.		Tail-plane.	Ele-vators.	Total.	Fin.	Rudder.	Total.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	square feet.			°	°	ft. in.	ft. in.	°	°	°	sq. ft.	square feet.			square feet.		
D.H. 1 ..	29 0	41 0	41 0	5 9	5 9	187·0	175·25	362·25	5·5	5·5	5 10½	0 0	0	3	3	64·0	37·5	23·0	60·5	3·7	15·4	19·1
D.H. 1A ..	29 0	41 0	41 0	5 9	5 9	187·0	175·25	362·25	5·5	5·5	5 10½	0 0	0	3	3	64·0	37·5	23·0	60·5	3·7	15·4	19·1
D.H. 2 ..	25 2½	28 3	28 3	4 9	4 9	128·0	121·0	249·0	3·0	3·0	4 9	0 0	0	4·0	4·0	56·0	20·6	13·5	34·1	2·7	11·0	13·7
D.H. 3 ..	36 9	60 3	60 3	6 9	6 9	323·0	302·0	625·0	5·0	5·0	7 6	0 0	0	4·0	4·0	102·0	76·0	50·0	126·0	10·0	21·3	31·3
D.H. 4† ..	30 0	42 4½	42 4½	5 6	5 6	223·0	211·0	434·0	3·0	3·0	5 6	1 0	0	3·0	3·0	82·0	38·0	24·0	62·0	5·4	13·7	19·1
D.H. 5 ..	22 0	25 8	25 8	4 6	4 6	111·2	100·9	212·1	2·0	2·0	4 9	2 3	0	4·5	4·5	46·4	13·4	12·2	25·6	2·2	6·3	8·5
D.H. 6 ..	27 3½	35 11	35 11	6 4	6 4	224·3	212·0	436·3	4·0	4·0	5 8½	0 0	0	2·0	2·0	76·0	36·0	26·0	62·0	5·5	12·0	17·5
D.H. 9 ..	30 10	42 4½	42 4½	5 6	5 6	223·0	211·0	434·0	3·0	3·0	5 6	1 0	0	3·0	3·0	82·0	38·0	24·0	62·0	5·4	13·7	19·1
D.H. 9A ..	30 3	45 11½	45 11½	5 9	5 9	249·03	237·70	486·73	3·0	3·0	5 6	1 0	0	3·0	3·0	74·36	38·0	24·0	62·0	5·4	13·7	19·1
D.H. 10‡ ..	38 10½	62 9	62 9	7 0	7 0	427·4	407·4	834·8	7·0	7·0	7 0	0 0	4	4·5	4·5	120·8	71·6	46·0	117·6	10·0	25·75	35·75
D.H. 10‖ ..	39 7½	65 6	65 6	7 0	7 0	429·2	408·2	837·4	7·0	7·0	7 0	0 0	2½	4·5	4·5	118·0	75·5	33·08	108·58	10·0	25·75	35·75
D.H. 10A ..	39 7½	65 6	65 6	7 0	7 0	429·2	408·2	837·4	7·0	7·0	7·0	0 0	2½	4·5	4·5	118·0	75·5	33·08	108·58	10·0	25·75	35·75

* Including *ailerons*. † All types. ‡ With two 375 h.p. Rolls-Royce Eagle engines. ‖ With two 400 h.p. Liberty engines.

over the top of the upper plane. Also the shape of the nose when fitted with a vertical B.H.P. engine has naturally been somewhat different from the nose of the R.-R. engine one. No fundamental changes have, however, been made. It might be mentioned, as it is not shown in the table, the figures of which refer to the standard performance—that a D.H. 4 with a 200 H.P. B.H.P. engine has actually been flown at speeds varying from 42 to 127 M.P.H., which is "some" speed range. The covering of the fore part of the body of the D.H. 4 is of three-ply wood, which was a somewhat unusual feature in a British machine at that time.

The D.H. 5

The pusher scouts having become obsolete, partly on account of the relatively poor performance of this type of machine, and also by reason of the adoption of the synchronized machine gun, Capt. de Havilland set to work to produce a tractor scout in which he aimed, not only at drawing full advantage of the better performance inherent to the type, but also at providing, to as great an extent as possible, the same good view in a forward and upward direction as that enjoyed in the pusher scout. The outcome of these efforts was the D.H. 5, in which the chief characteristic was the negative stagger. This feature lent a curious appearance to the machine, and when she first appeared there were those who were inclined to regard her as a freak. It was not very long, however, before flying tests demonstrated that her performance was good for her power, and from the reports of pilots who had flown her it appeared that she was not unduly difficult to handle. That she had her own little idiosyncracies which had to be learned and humored may be admitted (every machine has), but after pilots got into her ways she soon became popular, and during 1917 she was used in great numbers with good success. Although fitted with a slightly more powerful engine than was the pusher scout—a 110 Le Rhone against a 100 Gnome monosoupape—it is interesting to compare the performance of the two types. The ground speed of the D.H. 2 was about 93 M.P.H. while the D.H. 5 does 105 M.P.H. at 6,500 ft. The climb to 10,000 ft. was accomplished by the pusher in 18 min., 30 sec., while the tractor does it in 12 min., 4 sec. It would, therefore, appear that the advantage of the tractor is greater in the case of speed than as regards climb. One is the features of the body design which is out of the usual run of bodies is the manner in which the rectangular section fuselage is faired. In section it is an irregular octagon while in side view the corners of this octagonal section forms straight lines.

The D.H. 6

Towards the end of 1917 the question of training pilots became pressing, and the need for a machine designed especially for school work became apparent. To meet this demand the D.H. 6 was designed. The objects kept in view in designing her were: Simplicity, and therefore ease of manufacture, maintenance and repair, interchangeability of parts, low landing and stalling speeds. Hence the straight tips and control surfaces. The flat, and nearly vertical, nose of the fuselage might be thought to offer unnecessary resistance. It should be remembered, however, that this is a school machine, and we believe we are correct in saying that this detrimental surface was intended to assist in safeguarding the machine against being dived at too high a speed by inexperienced pupils. For the same reason plain cables are used in the wing bracing. An ingenious quick-release dual system of control is fitted, by means of which the instructor can cut out the pupil completely by the movement of a single lever, and it should be particularly noted that this quick release includes not only aileron and elevator, but also rudder control. A remarkable feature of the D.H. 6 is the low speed at which it can be flown. The standard machine has a maximum speed of 75 M.P.H. and lands at about 30 M.P.H., while it may be actually flown at speeds below 30 M.P.H. The standard model is intentionally made slightly unstable for purposes of teaching, but a few slight modifications will turn it into a stable machine. Furthermore, by fitting streamline wires instead of the wing-bracing cables and by cowling-in the engine the maximum speed can be increased to 90 M.P.H. In this form the machine should be very well suited to pleasure flying, especially as it was primarily designed for cheapness of manufacture.

(*Continued on page* 982)

Table of weights, etc., and performance of "Airco" machines.

Type of machine.	Engine.		Weight of machine (loaded).	Fuel capacity. (gallons.)		Range (in miles). *	Speed (m.p.h.).			Climb (in mins.) to		Ceiling.	Stalling speed.	Landing speed.	Load/sq.ft.	Load/h.p.	Military load.
	Type.	H.P.		Petrol.	Oil.		6,500	10,000	15,000	10,000	15,000						
			lbs.									ft.	m.p.h.	m.p-h.	lbs.	lbs.	lbs.
D.H.1A ..	B.	120	2,400				89†			12·17‡					6·6	20	520
D.H. 2 ..	G.M.	100	1.320				93†			18·5					5·3	13·2	200
D.H. 3 ..	2, B.	120	5,776			700	95†	87		32·8§					9·2	24	680
D.H. 4 ..	B.H.P.	200	3,246	66	5	600	113·5	111	104	17·5	35·5	19,000	42	52	7·4	16·2	545
D.H. 4 ..	R.A.F. 3A	200	3.340	65·5	4·5	500	120	117·5	110·6	14·2	29·3	19,000	42	52	7·7	16·2	545
D.H. 4 ..	R.-R.	250	3,400	65	4·5	500	117	114	102·5	16·4	36·7	19,000	42	52	7·8	13·6	545
D.H. 4 ..	R.-R.	370	3,472	66	5·5	500	136·5	133·5	126	9	16·6	23,500	42	52	8	9·4	545
D.H. 5 ..	Le Rh.	110	1,492	26	4	200	105	102	89	12·4	27·5	17,000		50	7	13·6	260
D.H. 6 ..	R.A.F. or Curtiss	90	2,000	25	4	300	70							30	4·58	22·2	
D.H. 9 ..	B.H.P.	230	3,300	71	12	560	116	111½	101	17·9	35	19,000	42	50	7·6	14·3	545
D.H. 9 ..	Lion	420	3,725	71¾	6½			140	135	8·17	14·6	25,300			8·5	8·8	545
D.H. 9A ..	L.	400	4,220	107	15	650	129	120	114	11·8	22·8	21,000	45	55	8·6	10·5	545
D.H.10A ..	2L.	400	8,500	215	24	650	134	124	117	11	20·5	20,000	45	55	10	10·6	1,000

B = Beardmore. G.M. = Gnome *monosoupape*. R.-R. = Rolls-Royce. Le Rh. = Le Rhone. L = Liberty.
* At full speed. † At ground level. ‡ To 6,000 ft. § To 8,000 ft.

RESISTANCE DUE TO NOSE RADIATOR

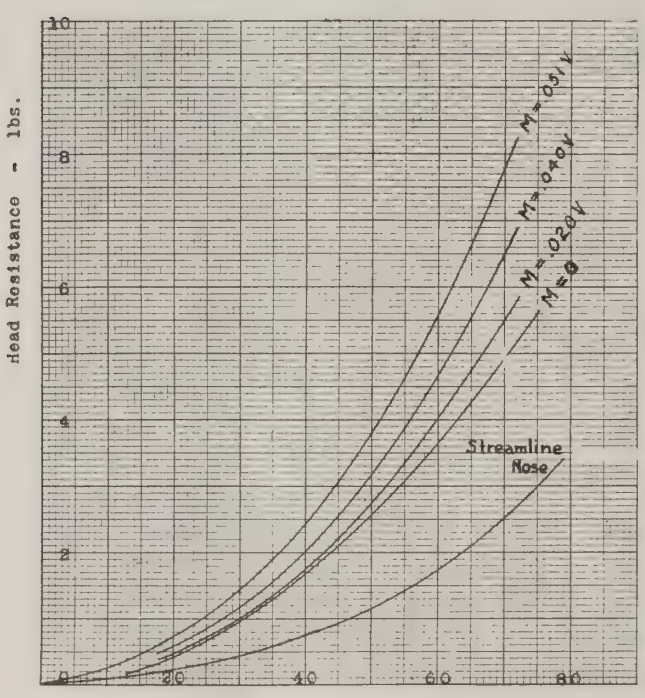
WIND tunnel tests on a model fuselage show the following qualitative results:

(1) *At any given plane speed* the total resistance of a fuselage with a flat nose radiator is increased by increasing the air flow through the radiator, either by opening exit vents for the air or by decreasing the resistance of the radiator to passage of air. This shows that a nose radiator—in contradistinction to a free air radiator—should be of compact construction with high heat transfer for low air flows through the core, therefore requiring a core of high resistance.

(2) *With varying plane speeds* the relative efficiencies of free air and nose radiators do not change.

(3) With all three widely differing types of core tried, the combined resistance of the fuselage and a free air radiator of given cooling capacity was from 10 to 50 per cent less than that of the fuselage with a nose radiator of the same core construction and equivalent cooling capacity.

(4) From other experiments performed at the Bureau of Standards it is clear that there is more chance for improvement in types of core for free air positions than in types of core for the nose position.



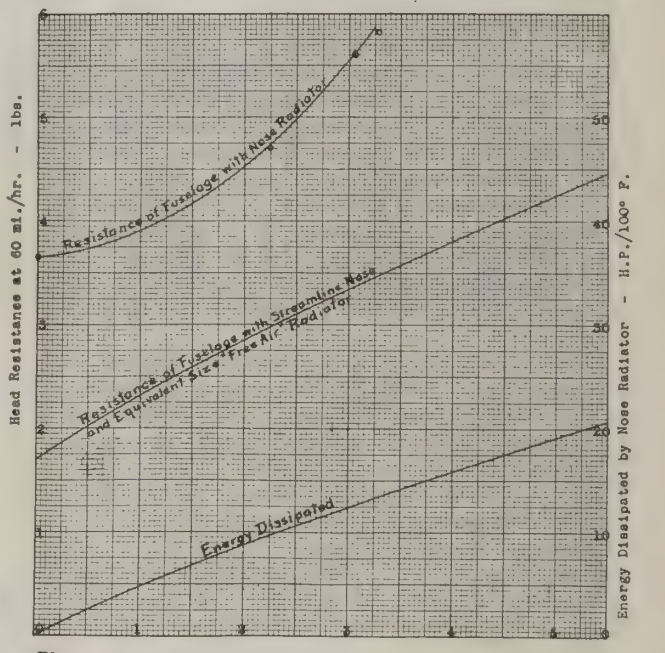
Plot 1. Free Air Speed—miles per hour (V) Resistance with various air flows (M) in lbs. per sec. per sq. ft. front, when V = free air speed in mi. per hr., compared with fuselage having streamline nose. Core No. A-23, Livingston 5/16" sq. cell, 5" deep

The present report considers the effect of placing a radiator in the nose of a fuselage as compared with the effect of placing a radiator of the same core construction, having an equivalent cooling capacity, in the free air and streamlining the nose of the fuselage. The results of these tests indicate less difference than would be shown by comparing results with radiators specially selected for each of the positions in which they were placed.

The results are qualitative only, but they are so striking as to indicate that the nose of the fuselage is not a desirable location for a radiator from the point of view of head resistance.

A model fuselage 60 inches long, 10 inches wide and 13 inches high was constructed with a removable streamline nose, which, when removed, allowed an 8-inch square section of radiator core to be placed in the nose. Two holes on each side of the fuselage, each about 1½ by 6½ inches, were cut about a foot back from the nose and fitted with adjustable sliding doors. By adjusting these vents the amount of air passing through the nose was varied.

The model was mounted in a 54-inch wind tunnel and the head resistance measured under the following conditions:

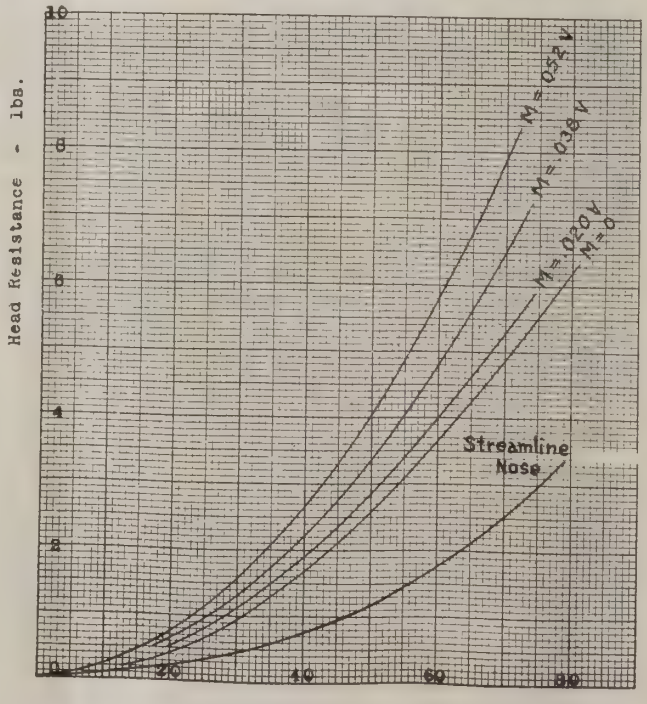


Plot 2. Mass Flow of Air—lbs. per sec. per sq. ft. front Core No. A-23, Livingston 5/16" sq. cell, 5" deep. Section of core 8" square in nose of model 60" long, 10" wide, and 13" high. Free air speed 60 M.P.H.

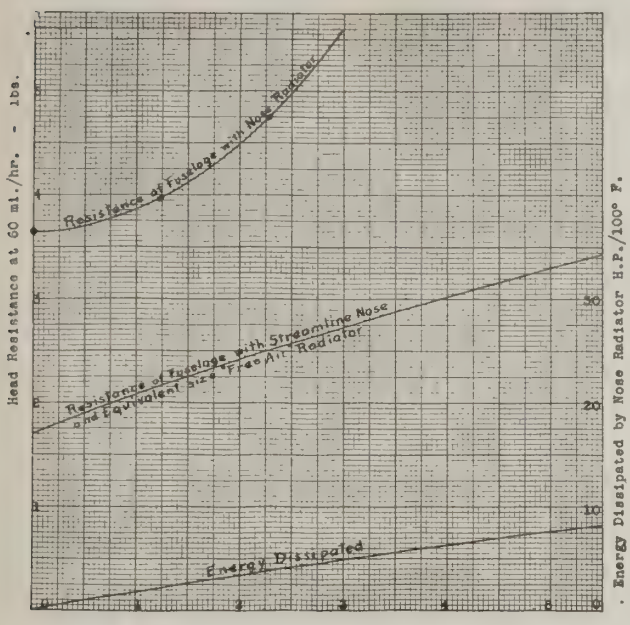
(1) Streamline nose on model. (No change in resistance was observed whether vents were open or closed.)

(2) Streamline nose removed, but nose radiator covered with a sheet of paper so that there was no air flow through the core. (3), (4) and (5) Nose radiator in place with varying amount of air flow controlled by opening the vents. Seven or eight different air speeds were tried in each case, the maximum being 70 miles per hour.

The results of these runs are given in plot 1, against free air speed. They show (1) that the streamline nose decreases the resistance of the fuselage by 50 per cent, and (2) that the total resistance of the fuselage increases rapidly when air is allowed



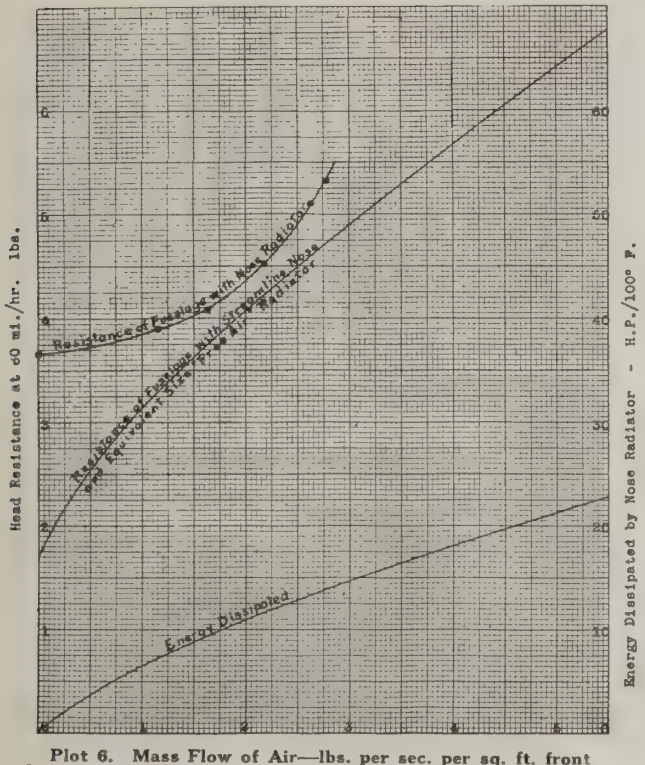
Plot 3. Free Air Speed—miles per hour (V) Resistance with various air flows (M) in lbs. per sec. per sq. ft. front, when V = free air speed in mi. per hr., compared with fuselage having streamline nose. Core No. B-1, Candler ⅜" hex. cell, 2½ in. deep



Plot 4. Mass Flow of Air—lbs. per sec. per sq. ft. front Core No. B-1. Section of core 8″ square in nose of model 60″ long, 10″ wide, and 13″ high. Free air speed 60 M.P.H.

to enter the radiator, so that a compact type of core is desirable for this position.

Plot 2 illustrates these conclusions more clearly, since there the resistance of the fuselage at 60 miles per hour free air speed is plotted against the mass flow of air through the radiator. There is also plotted the total resistance of the fuselage with a streamline nose, together with a free air radiator of the same core construction and of such size as to have a cooling capacity equivalent to that of the nose radiator at any given mass flow. Plots 3, 4, 5 and 6 give the same data for two other cores, 3 and 4 being for a core of very low head resistance and 5 and 6 for a core of very high head resistance, which would be a very good type for a nose radiator and a very bad type for free air. These are types of core considerably better for free air positions than those included in this test, while the core represented in plots 5 and 6 is probably one of the best for the nose position.



Plot 6. Mass Flow of Air—lbs. per sec. per sq. ft. front Core No. G-3. Section of core 8″ square in nose of model 60″ long, 10″ wide, and 13″ high. Free air speed 60 M.P.H.

Conclusions

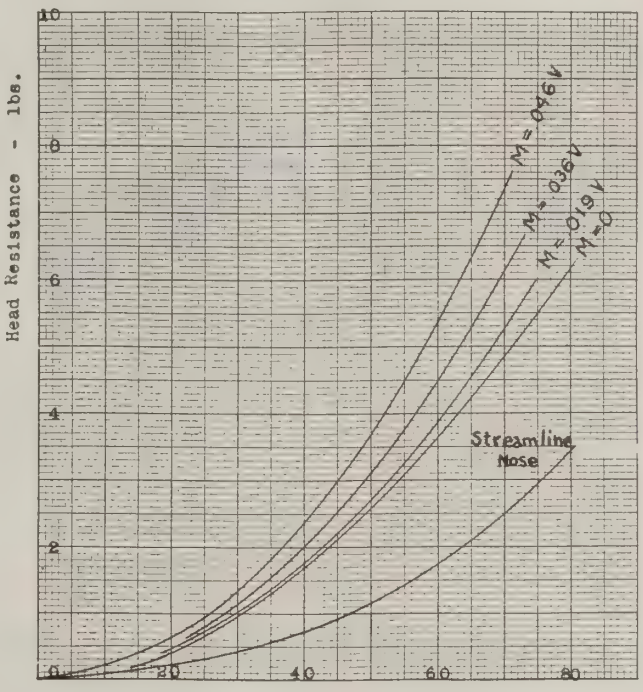
Based on the results of these wind tunnel experiments on a model fuselage, it is concluded that:

(1) The resistance of a fuselage with streamline nose is increased more by removing the streamline nose and substituting a radiator than it is by adding an equivalent free air radiator and retaining the streamline nose.

(2) Between good radiators for each position the increase of resistance due to the nose radiator is roughly double that due to the free air radiator.

(3) Above a very low mass flow, the nose radiator becomes relatively worse and worse as the mass flow is increased by opening the vents at a constant free air speed. This fact is of great importance, since the space available for a nose radiator is so limited that the highest possible mass flows are used in practice.

(4) It is found that the relative efficiency of the nose radiator and the free air radiator does not change appreciably with free air speed for a given setting of the vents.



Plot 5. Free Air Speed—miles per hour (V) Resistance with various air flows (M) in lbs. per sec. per sq. ft. front, when V = free air speed in mi. per hr., compared with fuselage having streamline nose. Core No. G-3, Spirex, 3⅜ in. deep

Gluing Veneer at High Moisture Contents

It is common practice among plywood manufacturers to dry veneer down to very low moisture contents before gluing it. The object in doing so apparently is to prevent shrinkage of the veneer and consequent marring of the appearance of the finished panel. The drying is done in plate redriers, textile driers, or similar apparatus, and adds appreciably to the cost of manufacturing panels.

That such preliminary drying may not be necessary is indicated by the results of a recent investigation by the Forest Products Laboratory. Veneer panels were glued with casein glue at various high moisture contents (some over 50 per cent), and in various tests proved as strong and as desirable as those made under drier conditions. In fact, in the moisture resistance tests a considerable proportion of the veneer which had been dried before gluing showed signs of failure, whereas veneer glued at a moisture content of 15 per cent or higher gave practically perfect results. Panels made at high moisture contents checked if dried too rapidly, but this difficulty could be avoided by proper operation of the kiln.

It seems possible, therefore, that the cost of producing panels of certain kinds may be very materially lessened through the use of water resistant glue and the reduction or even elimination of preliminary drying. Very dry veneer is more likely to break or split than damp veneer; an additional saving is therefore possible through a reduction of waste.

The use of moist veneer, of course, is not practicable for some purposes, but it is quite certain that much of the veneer which is now being painstakingly dried before gluing might advantageously be glued at a higher moisture content.

THE SMITH PARACHUTE

THE U. S. Army, having placed very rigid requirements for parachutes, found practically all available types below the requirements for strength. Test strength consists of a test equivalent to carrying a man weighing 200 pounds, traveling at a speed of 300 miles per hour.

The chute designed by Mr. Floyd Smith of McCook Field has been developed and has passed this test on numerous occasions. Although this chute is not considered the last word and experiments are still in progress with a view to improving it, it is thought by officers of the Army Air Service to be best on the market to-day, either foreign or domestic.

This chute is of a flat type, 28 feet in diameter, with a 42-inch patent shock absorbing vent supported by 40 silk shroud lines of 250 pounds breaking strength. The shroud lines are arranged in four groups of 10 each tied to a D ring, which in turn is sewn into the harness webbing. The D ring has a strength of 5,000 pounds, and the webbing fails at 3,400 pounds. No. 8 Mommo Shantung silk, having a tensile strength of 56 pounds per inch laterally and 42 pounds per inch lengthwise, is used for fabric, which gives a strength far greater than the other parts of the chute.

The total weight of the pack complete is 12 pounds 4 ounces. Several different types of packs have been devised in order that they may not prove a burden to the wearer. The accompanying photographs show the pack, which is 18″ x 12″ x 3″, carried on the back, acting at the same time as a cushion in a specially designed seat. This pack can be operated either by attaching the rip-cord to the plane, or the wearer can pull it himself, either before or after jumping, depending upon the circumstances.



© Underwood & Underwood

Parachute nearing the ground after a 1,000 foot drop

Numerous tests have proved the absolute necessity of the aviator being well clear of the machine before the opening of the chute to avoid having it carried into the tail surfaces by the very high velocity slip stream. The advisability of having the chute entirely free from the plane has been well demonstrated also. The fact that the two main conditions calling for the use of a parachute are, first, fire danger, and second, the collapse of some vital part of the plane, logically the aviator in both of these cases wishes to clear the machine without depending on it in any way for the sucessful operation of his chute. Criticisms have been made in regard to the inability of the aviator to separate the release, or neglecting to do so, but drops by men entirely inexperienced in parachute jumping have proved to the contrary.

Future developments will probably follow very closey the lines as described in this chute in regard to operation. Undoubtedly there is a great deal of work still to be done on the best shape of chute. Although the Smith chute can be steered a limited amount, further development along this line may be expected.



Front, side and rear views of the Smith parachute which has recently undergone successful tests at McCook Field, Dayton, Ohio

NAVAL and MILITARY AERONAUTICS

55,000,000 Miles Flown in 18 Months

United States Army pilots flew 55,671,120 miles in the eighteen and a half months, between January 1, 1918, and July 17, 1919, according to an announcement made by the Director of the Air Service.

The figure is based upon an estimate of sixty miles for each hour of flying. This is a very low estimate, since most of the planes used could and did fly at rates between seventy-five and 120 miles an hour without counting the wind velocity, which at times reduced or raised their speed. The number of hours spent in the air by the army pilots was 927,852, about 106 years. It is hard to give an idea of what 55,671,120 miles means. It is equivalent to 2,227 circumnavigations of the globe at the equator. It is more than half the distance to the sun.

Kelly Field No. 2, at San Antonio, Tex., led all the rest in the matter of hours flown. The pilots of this field remained in the air 167,982 hours, more than nineteen years. Ellington Field, at Houston, Tex., was a moderately good second with 95,293 hours. The reason why Texas is the banner State for flying was that its fine climate and long stretches of flat lands, making perfect landing fields, caused it to be chosen for much of the training of new fliers. Rockwell Field, at San Diego, Cal., was third on the list, with 61,659 hours flown. At Hazelhurst Field at Mineola only 4,529 hours, in about six months, was flown.

No More Exhibitions Where Inadequate Landing Facilities Exist

Washington, D. C.—The announcement made by Major General Charles T. Menoher, Director of Air Service, to the effect that no further exhibition flights will be made at cities where inadequate landing fields are provided, serves as a warning to those who desire to reap the benefits which accrue from the use of aircraft, that the establishment of adequate landing facilities is an urgent necessity.

General Menoher in his statement refers to an accident which occurred in Boston at the only available landing field, and which was the result of the limitations of the field. No flights will be made over Boston until a suitable aerial landing field is provided, including satisfactory means of keeping spectators off the field while landings and starts are being made.

Eighth Aero Squadron at Border

McAllen, Tex.—The Eighth Aero Squadron, consisting of 18 officers and 107 men, arrived here recently with an equipment of twelve aeroplanes.

Air Service Less Than One-Tenth War Strength

Washington, D. C.—The Air Service reports a net decrease in the total commissioned and enlisted strength from the date of the armistice to July 10 of 91 per cent.

The following table shows the present distribution of personnel as compared with the latest revised figures of November 11, and the per cent decrease. The July 10 figures do not include 432 officers and 816 enlisted men in transit or at demobilization stations awaiting discharge.

	Nov. 11	July 10	Per cent net decrease
Cadets	6,483	7	99.9
Enlisted men.	167,986	13,597	92
Officers	20,554	4,432	78
Total	195,923	18,036	91



Lieut. Joe Weil, publicity officer at Ellington Field, and formerly managing editor of "Tale Spins"

NC-4 to Make Recruiting Flight up Mississippi

New York, N. Y.—After being exhibited for two weeks in Central Park, the NC-4, which made the first trans-Atlantic flight in history, is being dismantled for shipment to the Rockaway Naval Air Station. Here she will be completely overhauled preparatory to a recruiting flight upon which she will be manned by the same crew which took her successfully across the Atlantic.

Her itinerary will include the principal cities of the Atlantic and Gulf Coasts, probably a flight up the Mississippi, a circle of the Great Lakes and in all likelihood a visit to the Pacific Coast via the Panama Canal. California is bringing strong pressure to bear for a visit by the ship. Definite dates and stopping points have not been decided on.

150 Air Service Officers in Regular Establishment

Washington, D. C.—There are in the Air Service 149 flying officers of the regular establishment, thirteen of whom are balloonists and six observers. Of the 130 pilots many have flown only the training plane. A large percentage are beyond the age limit for pursuit pilots. A minority, who went overseas and became squadron or group commanders, are in condition for active flying duty.

In the following table is shown the distribution of the regular flying officers by rank. Of 130 captains of the line, 121 hold military aviator or junior military aviator ratings, which makes them majors in the Air Service, and of the fourteen first lieutenants of the line three hold the same ratings which advances them one grade in the Air Service.

	Temporary rank	Rank held as M.A. or J.M.A.	Regular line rank
Brig. General	2	..	..
Colonel	17	..	..
Lt. Colonel..	50	2	2
Major	66	123	0
Captain	8	10	130*
1st Lieut.....	6	11	14
2nd Lieut....	0	3	3
Total	149	149	149

*One captain retired.

Recruiting for Naval Air Service Resumed

Washington, D. C.—Recruiting for the naval aviation service has been resumed. All men in class V of the Naval Reserve, who are now on inactive duty who are desirous of joining the regular force as aviation mechanics, may be enlisted as apprentice seamen and will then be given rating in the aviation branch. These men will have their choice of transfer to the aviation mechanics school at any of the following naval air stations: Chatham, Mass.; Rockaway, N. Y.; Cape May, N. J.; Hampton Roads, Va.; Key West, Fla.; Pensacola, Fla.; Akron, Ohio; San Diego, Cal.; Coco Solo, C. Z.; or the Naval Training Station at Great Lakes, Ill.

NC-2 to Be Put in Commission

Washington, D. C.—It is stated that the NC-2 will be repaired and placed on active duty. This flying boat differs from her sister ships in that her four motors are arranged in two pairs of one pusher and one tractor units. The NC-4 is to be placed on exhibition at the Smithsonian Institute. The NC-1 is at the bottom of the Atlantic and the NC-3 is dismantled and in storage.

Air Service Represented On Pyrotechnic Signal Board

Washington, D. C.—A Board of Officers is being convened to meet on August 1, 1919, at Ft. Sill, Oklahoma, for the purpose of developing a system of pyrotechnic signals and drawing up specifications for suitable pyrotechnic material. The following officers constitute the Board: Lieut. Colonel W. B. Harding and Major A. B. Quinton, Ordnance Department; Lieut. Colonel H. C. Tatum, Cavalry; Lieut. Colonel E. R. Coppock, Infantry; Captain D. H. Arthur, Air Service, and Lieut. Colonel H. Parkhurst, Field Artillery. It is directed that the Chief of Ordnance, Director of Air Service and Commanding General of Fort Sill render such assistance as is desired by the Board where such is possible.


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SUIZA
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Engines



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Wright-Martin Aircraft Corporation

New Brunswick, N. J.

FOREIGN NEWS

Aeroplane Transport Scores Beat for London Paper

A very fine object-lesson is afforded of the superiority of the aeroplane in times of emergency over other orthodox forms of communication, in the hustle which Mr. Ward Price, the *Daily Mail* correspondent, indulged in on Peace-signing day, last Saturday. Immediately after the signature of the Peace Treaty in the Hall of Mirrors, Mr. Price motored to Buc, and, there taking an aeroplane, reached London in time to write a complete story of the happenings for the edition of the *Weekly Dispatch* published at 3.30 on Sunday morning. By way of contrast, the Paris Post Office was congested with telegrams, some of which took 24 hours to reach London.

Through Mr. Ward Price's flight the *Weekly Dispatch* was enabled to publish a much fuller account of the signing than any other Sunday paper, in addition to a whole page of photographs taken during the afternoon, which were also brought by aeroplane.

Argentine Aviators Arranging Plymouth-Buenos Ayres Flight

Three flying men from South America, Capt. Angel M. Zuloaga (commander), Capt. Annibal Briguega (navigator), and Eng. Ambrosio Taravella (mechanic), are visiting London with a view to completing preparations for a flight from Plymouth to Buenos Ayres *via* Portugal and Africa, some 8,000 miles, the Atlantic crossing, representing about 1,500 miles.

The flight may be made in an F-5 flying boat if one can be purchased from the British Government.

Airship Service Between Milan and Venice

It is reported from Milan that the airship service between Milan and Venice has been inaugurated. The dirigible "F. 6" left Buggio, near Milan, with 30 passengers on board, on June 23, while at about the same time the "N. 14" left Campalte, near Venice, carrying 20 passengers. Both airships are said to have made the journey successfully.

Aerial Mail Service to Foreign Countries Contemplated by British Post Office

London.—An aerial mail service to foreign countries is being seriously considered by Great Britain, the assistant postmaster announced in the House of Commons on July 18. It might not be long, he said, before mails would be carried to Australia, China, and elsewhere in a comparatively few hours, revolutionizing mail transportation.

Danish Government Buys Bristol Planes

The Danish Government has taken a decided step in the direction of the speedy development of aerial navigation between Denmark and the neighboring countries. A considerable number of Bristol biplanes have been acquired on behalf of the nation and are now on their way to Denmark. Accompanying them are a number of skilled British airmen, who are to act as instructors of the Danish pilots to be employed on the projected services. By reason of its peninsular formation, Denmark has always suffered many of the handicaps of isolation. The tedious sea journey to the other countries of Scandinavia or to Britain, or the inconvenient train route through Hamburg to the rest of Europe have militated against the speediest trade relations, and it is to obviate these limitations that extensive aerial services are now being organised.

Mexican Soldiers Bomb Comrades

It is reported that Government planes, scouting for Villa bandits, sighted a unit of Government infantrymen under the command of General Pablo Gueroga, and dropped a number of bombs among them. The casualties are not yet reported.

French Government Plans Long Distance Flights Over European Capitals

Paris.—The French Aeronautical Department has arranged for a series of long-distance flights to be made by war pilots over various capitals. London, Madrid, Constantinople, Prague, Warsaw, Vienna, Brussels, Amsterdam, and Cairo (via Constantinople) are included. Trips will also be made to Tunis, Algiers, and Dakar (West Africa).

French Aviation Mission for Turkey

Paris.—The French Chamber is expected to vote additional credits for the establishment of an Aviation Mission in Turkey, entrusted with the organization of the following postal lines: Constantinople, Smyrna, Grecian Archipelago; Constantinople, Palestine, Messa, Egypt; Constantinople, Armenia, Caucasus, Persia; Constantinople, Bucharest, South Russia; Constantinople, Salonika, the Balkans. It is stated that these lines will be carried on by the military until French air navigation companies have been floated.

Swedish Midget Plane Tested

Stockholm.—A trial flight of an experimental midget aeroplane constructed at the Paalson works of Malmoe is reported to have been successful. The machine is said to weigh only 700 lb., and it is capable of carrying another 400 lb. The body is described as cigar shaped, and constructed so as to reduce the air resistance to a minimum. It has a Thulin 50 h.p. Gnome engine of special construction, capable of giving a speed of about 80 miles an hour.

Avro Passenger Carrying Service Profitable

The A. V. Roe Co. have secured the services of Lieut.-Col. G. L. P. Henderson and placed him in charge of the passenger carrying service. The aerodrome is at Hounslow; although this locality is said to be quite inaccessible to the metropolis, seven aero machines: two five-seaters, two three-seaters, a dual control two-seater, a Baby Avro and a three-seater limousine are in constant service. The fee is over $5.00 and from 250 to 300 passengers are carried on Saturday. Monday, the poorest day, averages 60 passengers, and the total average is over a hundred per day.

Deutsch De La Meurthe Gives Two Million Francs for Flying Meets

Paris.—M. Henri Deutsch de la Meurthe, President of the Aero Club of France, has given the club a generous gift of two million francs for the purpose of organizing flying meets.

German Aero Transport Firms Active

Advertisements are being carried by German papers announcing that an air service has been started by the Luft Fahrzewg Ges. from Stralsund to Sassnitz, Binz, Sellin, Gohren and connecting with the Berlin-Stralsund line. The rates for passengers from the above seaside resorts is 150 marks, and the fare from Stralsund to Berlin, 600 marks.

The Hamburg-American line advertises daily freight and passenger service between Berlin, Leipsig—Weimar, Berlin—Hanover—Gelsenkirchen, Berlin—Hamburg.

Rome-London Flight Planned

The Fiat Co. is arranging for a non-stop flight from Rome to Kenley, near Croydon, a distance of 1,100 miles.

British Policy of Scrapping New Planes Criticized

London.—Considerable discussion has been aroused by the scrapping of new machines and engines, which has been going on in Great Britain.

Vast numbers of new aircraft have, immediately on completion, been sent to the Government-owned aircraft factories throughout the country to be burned and the waste thus caused has been stupendous.

The latest report of the Select Committee on National Expenditure makes a point of the fact that numbers of new aircraft were accepted from their constructors and sent straight away to these national factories to be destroyed.

The report states that following the armistice, the Air Council met and decided to inform the Ministry of Munitions that they required no more aeroplanes. This decision, however, was not adhered to, and in December last they wrote to the Ministry of Munitions stating that they appreciated that labor and other considerations might prevent the Ministry of Munitions from arranging a complete cessation of further deliveries, and for this reason the Air Council would accept aircraft and engines of which production is required by these considerations.

The report proceeds: "Accordingly, machines were taken in large numbers from contractors, which were not wanted, and as national factories had to be kept going, it was necessary to find work for the people there, with the result that the machines taken from contractors to keep the people at the contractors' factories employed, were sent to the national factories to be destroyed, in order to keep the people at the national factories employed."

It must be remembered that England had for more than four years been working up a maximum production in aeroplanes. The armistice came almost as a surprise and it was utterly impossible to at once bring the wheels of production to a standstill.

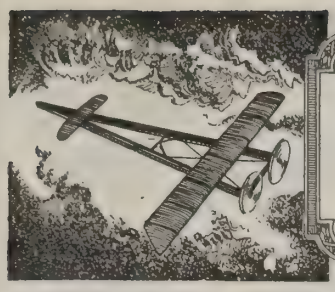
Aeronautical Intelligence Bureau Formed in England

The Aeronautical Intelligence Bureau, Ltd., was incorporated on June 13th. The chief objects are: (A) To unite and combine aeronautical firms for the purposes of mutual advancement and protection. (B) To protect the members of the Society from financial risks by obtaining and distributing information concerning firms undeserving of mercantile credit. (C) To keep a register of bankrupt persons and those in winding up or liquidation. (D) To procure the amendment or repeal of legislation injurious to the members. (E) To procure information as to the standing of firms.

Other points are:—(1) That members are entitled to unlimited investigations. (2) That no member's interests are divulged to another without his written assent. (3) That ordinary letters will take the place of the usual stereotyped inquiry forms. The offices are at 30, Bedford Row, W. C., London.

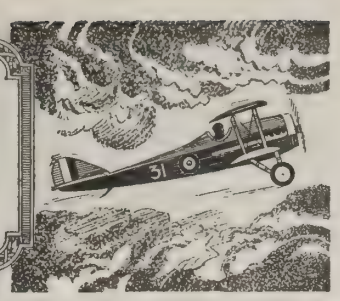


A section of the hangars at the Fiat Company's experimental field near Turin. Note the method of opening the hangar doors



ELEMENTARY AERONAUTICS *and* MODEL NOTES

By John F. McMahon



CLUBS

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INTEREST in the light type aeroplane is growing, more so now than before, perhaps, owing to the returning aeroplane pilots and mechanicians released by the Government.

All of these young men want to fly, and as many are unable to buy or build a large heavy motored machine they are naturally turning to the next best type, or what we call the light type machine.

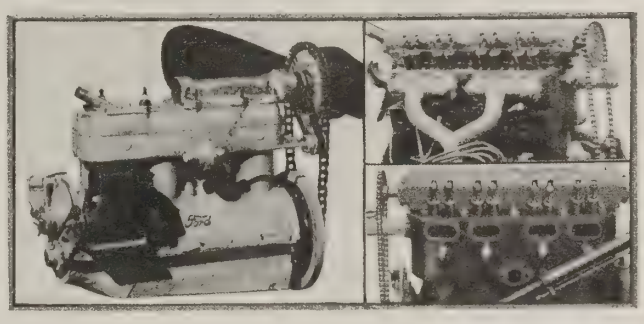
The aeroplane accessory and motor firms have anticipated this, and many accessories and parts for constructing these little machines are offered for sale all over the United States. The motorcycle machine recently described on this page met with a great deal of favor from the readers, but owing to its small reserve horsepower it cannot be called a capable machine.

The Ford motored aeroplane, which had for its power plant a redesigned Ford motor, has been taken seriously by the readers after first fears and surprise that the Ford should be strong enough to carry a big machine into the air and fly it at speeds up to 60 miles per hour. The Ford motor is flying aeroplanes to-day all over the country, and many firms are specializing in Ford motors redesigned for aeroplane work.

A new motor is that produced by the Craig-Hunt Company, which was developed for racing cars, but can be used in aeroplanes as well, and should be an improvement over the old form of motor not having the overhead valves. It is claimed that a speed of 90 miles per hour has been made with a specially made up car with this power plant. The valves are operated by an overhead camshaft, which is driven by a chain and gear arrangement. There are four valves to each cylinder, two intake and two exhaust, located overhead and seated at an angle of 20 degrees.

The valves are 1½ inches in diameter and operated in pairs by rocker arms of the forked type. Each rocker arm is operated by the overhead camshaft, which runs on three ball bearings, all of which are enclosed in an oil-tight aluminum housing. The cams are of the roller follower type, each of which dips in oil and lubricates the roller end of the rocker arm.

There are two spark plugs to each cylinder, set below and



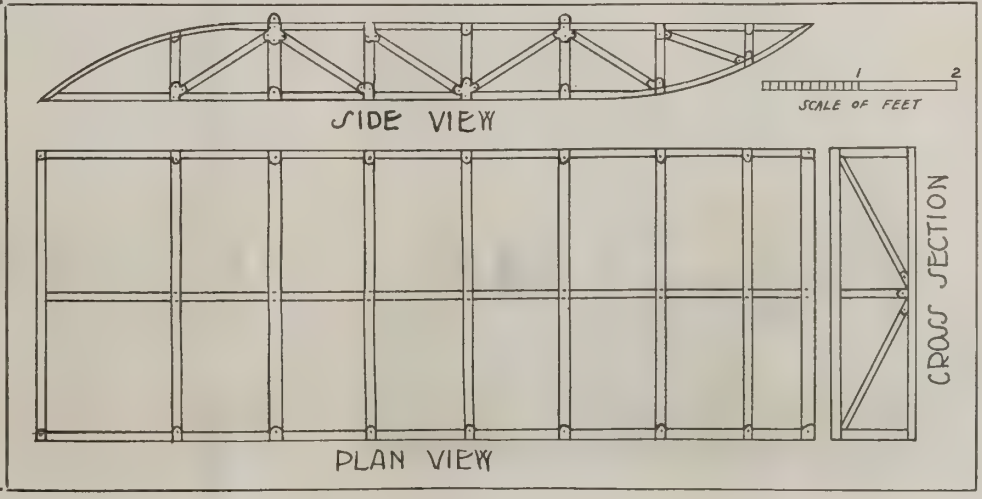
between the valves on each side of the head. The intake manifold is so arranged as to allow the installation of either a 1¼ or 1½-inch carburetor.

Of course for aeroplane work the heavy flywheel and transmission is done away with, as the propeller acts as a flywheel, and if pistons and connecting rods are carefully weighed to be sure that they are all the same weight, all vibration will be eliminated and the engine should perform well.

The Ford motor can be successfully used in an aeroplane without the use of an overhead attachment, but if one can be purchased light enough so as not to increase the weight too much, it would be better to employ one. From time to time we will show different Ford motor inventions as well as those for other motors that will increase the power and revolutions per minute.

This motor should be compared with the one built by P. P. Belt of Fredonia, Kan., which he used in his pusher type aeroplane with great success, giving a thrust of 350 pounds. This motor was a regular Ford with a special bearing block fastened to the top of the motor with the cylinder head bolts, to which the propeller was fastened. This motor was described in February 24th issue.

The accompanying drawing shows the general outline and method of construction for the pontoon to be used with the Ford Motored Aeroplane described in "Aerial Age" some time past. The general description of this pontoon appeared in "Aerial Age" last month





Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Dirigible Balloonacy

The *Aeroplane,* a British publication, thus discusses an article which was published recently in an American periodical dealing with the uses of airships in times of peace. The following suggestions are made:

"'The dirigible will be useful to the Bureau of Mines because it can carry prospectors at low altitudes as they search for symptoms of minerals.

"'In tropical forests trees of great value can be hunted for by their flowers, leaves or other symptoms seen from above.

"'In countries where migratory insects like locusts need surveillance, scientific measures can be taken to find their breeding places and sterilize the egg-laden areas. A dirigible can follow a locust cloud and by the use of gases and explosives disperse it or drive it away from valuable crops.

"'The Revenue Guards and the Department of Justice can use the dirigible to detect smugglers and to pursue large bands of outlaws, especially if they are mounted or have stolen live stock or property in vehicles.'

"One does not know which suggestion to admire most. The bombing or gassing of locusts appear to be the most practical, and would seem to provide better sport than the hunting of trees by their symptoms.

"The pursuit of large bands of outlaws seems to offer great possibilities. Large bands would, of course, be chosen, because the smaller bodies of bandits would not have sufficient strength to pull down the dirigible in order that they might be arrested."

Has anyone suggestions of similar character to offer for the application of aircraft to commercial uses? The Aeronitis editor will be glad to receive them with a view of publishing the most practical suggestions.

Air and Water



—From *The Dallas News*

Farewell, O Pioneer

Farewell, O pioneer
Of skyland's infinite realm!
You fought through fog and gale,
With heroes at your helm;
With luck invoked, you sail.
The path you bravely laid
Will broaden with the coming day,
The trip you dared and made
Unites our lands another way.
Farewell, O pioneer!

—*M. J. A., in New York Times.*

Overheard During the Visit of the R-34

Bystander throwing lighted match down on the ground. "I can't see why they won't let us go closer to the darn thing."

"My," said a sweet young thing, ambling about the side lines to a sweaty, tired guard, "does the wind make that balloon sway like that?"

"Naw," replied the guard in disgust, "they're just feeding it meat."

One dear old lady, with silver hair, remarked to her husband, who had no hair, "I just know it must be awfully hard for those poor men to hold on when the captain decides to loop the loop."—*Air Scout.*

The moral pointed by the behavior of the R-34 at Mineola would seem to be: You can't keep a good blimp down.—*Evening Mail.*

Kiwi or Kiwi-Kiwi

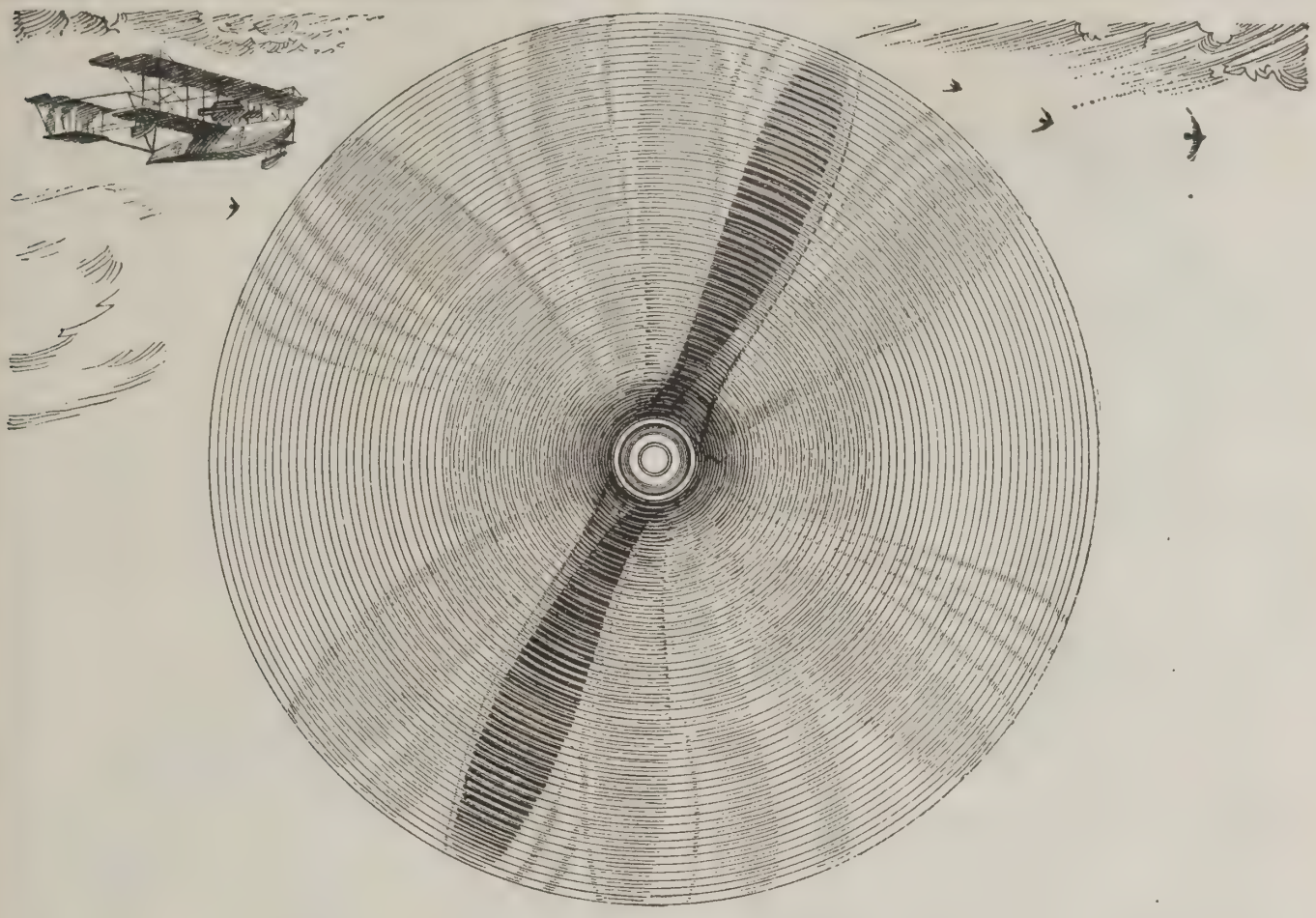
Kiwi—the Maori name for this queer *bird*—which was introduced in England by Mr. Lesson in 1823, is now generally adopted in all countries. It is easily distinguished from all its allies because of such a small body and comparatively small head and eyes. This curious flightless bird with its functionless wings and long thin legs is one of the most characteristic fowls of New Zealand. Zoologists placed it with the Penguin class. It is of a rich brown color with longitudinal yellow stripes and when grasped feels very soft—just as if its body contained no bones.

Kiwis have been seen on high hills but are met with mostly at very low levels. Parties from six to twelve were once seen but now flocks can hardly be hoped for. In the daytime they are very shy and inactive. When disturbed while sleeping they have a peculiar way of yawning. If molested they ruffle up their plumage, snap their bills, and make a loud noise which resembles a little growl. On moonlight nights they are seen running wildly through the woods, flapping their wings frantically and whistling loudly, attempting to fly as the other birds do. The Kiwi then is a bird which creates a lot of noise but cannot fly..

L. A. R.

(Kiwis may be seen at almost any aerodrome more than two years in existence.—Ed.)

References: Birds by A. H. Evans, Cambridge Natural History, Brittania Encyclopaedia.



The most terrific varnish test in history!

700 miles an hour for 26 hours—*and Valspar won*

DURING the trans-Atlantic flight of the NC-4 the strain on her huge Valsparred propellers was *terrific*.

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This amazing propeller speed was maintained throughout the entire 26 hours of trans-Atlantic flight—all the way from Newfoundland to Portugal—through blinding fog and mist.

Never yet has any varnish been called on to undergo such a terrific test. Had even a very little water penetrated the varnish, the tips of the blades would have begun to "fray." Then the laminated strips would have swelled and separated and the blades of the propellers would literally have flown to pieces, landing the NC-4 on the ocean, helpless.

But Valspar protected these laminated propeller blades perfectly, as it did all other varnished parts of the NC-4.

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(*Continued from page* 971)

The D.H. 7 and D.H. 8

We now come to a short gap in the series of D.H. machines. The next two types, we understand, never got any further than the drawing-board stage, and we have not been able to obtain any particulars of them.

The D.H. 9

The experience gained with the D.H. 4's demonstrated that placing the pilot in between the planes did not tend to give him an ideal position for fighting, and also when bombs had to be carried little space was left in the part of the machine where they could be most suitably placed; that is, in the neighborhood of the c.p. These drawbacks were remedied in the D.H. 9, by rearranging the pilot's seat considerably farther aft than it was placed in the D.H. 4, and, of course, readjusting the position of other weights in relation to the wings so as to maintain the longitudinal trim of the machine. The fitting of a vertical engine instead of a Vee enabled the designer to narrow down the front portion of the fuselage considerably, which resulted in a fuselage of beautifully clean lines with, it may be assumed, a comparatively low resistance. One of the features which has helped to give this machine its clean appearance is the placing of the radiator, not in the nose, as in the D.H. 4, but in the floor of the body. An ingenious feature of this radiator mounting is that the radiator can be moved up or down, thus varying the cooling to any desired extent by blanketing a larger or smaller portion of the cooling surface. The machine has been extensively used for fighting, reconnaissance, photography, etc., and also by the Independent Air Force for long-distance bombing by day and by night. It was the D.H. 9 which was largely used for the day bombing raids on German towns.

In connection with the D.H. 9 it is of interest to note that one of these machines fitted with a 420-H.P. Napier "Lion" engine did a speed of 140 M.P.H. at 10,000 ft., which altitude it reached in the extraordinary short time of 8 min., 10 sec. The same machine, furthermore, had a ceiling of 29,000 ft., although with a load slightly lighter than the standard.

The D.H. 9A

With the insistent demand for better and still better performance the necessity of fitting engines of greater power became urgent, and the D.H. 9A was produced to meet these demands. Except for the front portion of the body it was not greatly different from the D.H. 9. It has, however, a somewhat larger area, so as to obtain the same landing speed for the heavier weight. The object had in mind when designing the D.H. 9A was to provide an improvement on the 9, namely, to carry a greater load while maintaining a high performance. Apart from being extremely useful for long-distance reconnaissance, photography and fighting, this machine has been largely used for long-distance day bombing raids. The accompanying table will give a good idea of the manner in which the designer succeeded in attaining his purpose, and it is of interest to mention the following facts in addition: By increasing the military load from 545 lbs. to 945 lbs. the speed at low altitudes is reduced to 125 M.P.H., and at 10,000 ft. to 114½ M.P.H. The climb to 10,000 ft. with this load occupies 15.05 minutes and the ceiling is 19,000 ft. The range is reduced to 620 miles. (The reduction in speed is largely due to the fact that the extra load in bombs is carried outside.) By way of showing the weight-carrying capacity of this machine it is of interest to note that it has flown successfully with a military load of 1,325 lbs.

A machine of this type has also been fitted with a 360 H.P. Rolls-Royce engine, and, carrying a military load of 1,745 lbs., reached a ceiling of 16,500 ft. with a speed of 107½ M.P.H. at 10,000 ft. This machine differed from the standard 9A in that its fuel tankage was only 71 gallons, having a larger margin for load. It should also be noted that the above speed was reduced by about 4 M.P.H., owing to the bombs and carriers being put outside.

The D.H. 10 and 10A

The object in designing this machine was to produce a high performance, self-defending, long-distance daylight bomber. The armistice came along before the D.H. 10's were built in great numbers, and so this type has not had the opportunity of proving itself to the same extent on active service as have the other types of D.H.'s. Judging from its performance, however, it is safe to say that it would have proved a formidable antagonist. It will be seen from the table that when carrying three men, 1,000 lbs. of bombs, full military equipment, and sufficient fuel for a flight of 700 miles, the performance is so extraordinarily good as to be superior to any German machine *of any type whatsoever*. The machine would, therefore, be able to go out over the lines with its tanks full for a long journey and with a heavy load of bombs, and yet be entirely immune from enemy attack by aeroplanes. This may be regarded as an achievement to be proud of in a daylight bomber. The manœuvrability of the D.H. 10A is as good as is its performance, and one of these machines has been looped by the late Capt. B. C. Hucks.

BOOK REVIEWS

AVIATION ENGINES, *by Lieut. Victor W. Pagé.* A complete practical treatise outlining clearly the elements of internal combustion engineering with special reference to the design, construction, operation and repair of aeroplane power plants; also the auxiliary engine systems, such as lubrication, carburetion, ignition and cooling. It includes complete instructions for engine repairing and systematic location of troubles, tool equipment and use of tools, also outlines the latest mechanical processes. Price $3.25, post paid.

AERONAUTICAL ENGINES, *by Francis John Kean.* This volume has just been revised and enlarged and therein is comprehensively explained several types of aeroplane motors, such as Curtiss, Mercedes, Gnome, Anzani Ten-Cylinder Radial Air-Cooled Aero engines, etc. It also contains numerous plates and is fully illustrated. Price $2.75, post paid.

DYKE'S AUTOMOBILE AND GASOLINE ENGINE ENCYCLOPEDIA. The author has brought out this 1919 edition to further educate the readers of this Encyclopedia and to broaden their knowledge on points overlooked in previous editions. If you are interested in engines of every description and type, such as those installed in automobiles, motorcycles, motorboats, aeroplanes, etc., you should be an owner of this volume. It is valuable on account of its complete and thorough information. Price $4,50, post paid.

HIGH SPEED INTERNAL COMBUSTION ENGINES, *by Arthur W. Judge.* This volume is the outcome of an endeavor to collect and to classify, in as brief a form as possible the more important information relating to the subject of high speed internal combustion engines, as viewed from the theoretical and experimental sides. It treats of the thermodynamics of the internal combustion engines, explosion and combustion in the engine, conditions occurring in actual engines, pressures and temperatures in internal combustion engines, indicators and indicator diagrams, mechanics of the high speed internal combustion engines, and engine balance. It is fully illustrated and contains many valuable tables. Price is $7.50, post paid.

THE A B C OF AVIATION, *by Victor W. Pagé.* A non-technical manual, containing instructions for lining up and inspecting typical aeroplanes before flight and also gives easily understood rules for flying. It treats of aeroplane fuselage construction, power plants, propeller construction and action, equilibrium and control principles, uncrating, setting up, and aligning, inspecting aeroplane before flight, and also contains a most complete nomenclature of aeronautical terms. Price $2.75, post paid.

THE PRINCIPLES OF AEROPLANE CONSTRUCTION, *by Rankin Kennedy.* This work is intended to show the principles of the aeroplane as applied to flying machines and to put in as concise a form as possible the theory of the plane, commencing with the elementary laws of mechanics and the inclined plane, afterward giving the formulae for the determination of the principal dimensions of the aeroplane in the simplest form, with numerically worked out calculations on the two systems in use. Price $2.20, post paid.

PRACTICAL AVIATION, *by Charles B. Hayward.* A thoroughly comprehensive volume treating of several phases in aeronautics, such as: Dirigible Balloons, Theory of Aviation, Design and Construction of Aeroplanes, Aviation Motors, Types of Aeroplanes, Military Uses of Aeroplanes, Building and Flying an Aeroplane, etc. This is an extremely popular publication. Price $4.00, post paid.

PROPERTIES OF AEROFOILS AND AERODYNAMIC BODIES, *by Arthur W. Judge.* A technical treatise compiled for use among aeronautical engineers, draughtsmen and students. This is fully illustrated and contains many valuable tables. It is intended to form a companion volume to the author's "Design of Aeroplanes." Price $6.30, post paid.

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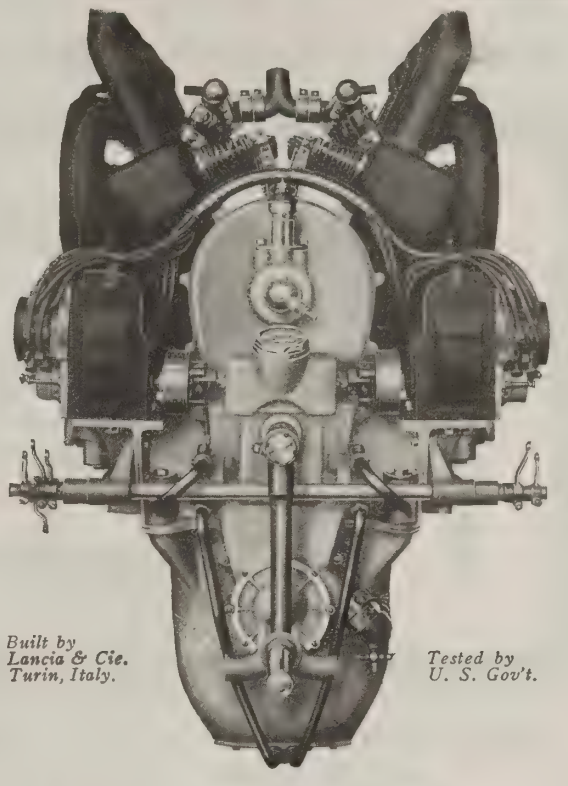
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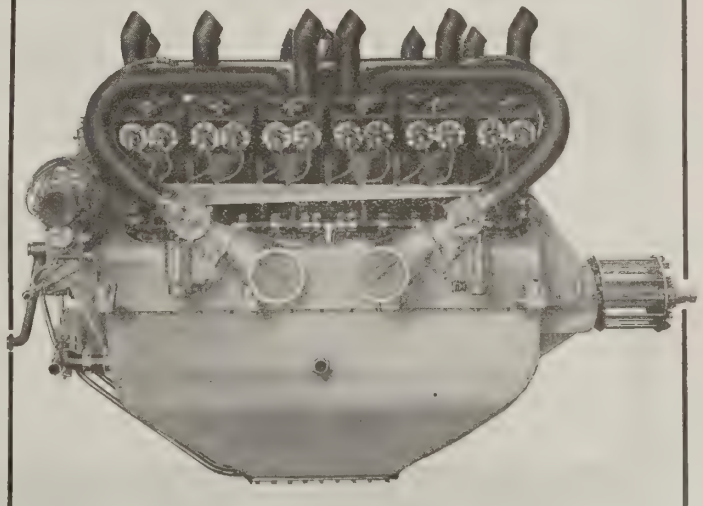
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Additional coverage may be had against loss by wind storm, cyclone or tornado.

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Special Orders Nos. 156 to 161 Inclusive

Second Lieut. Charles C. Chauncey will proceed to Caldwell, N. J., to the commanding officer Air Service detachment national rifle range, for the purpose of participating in national rifle matches.

Second Lieut. Edward N. Fortson will proceed to Houston, Tex., and report in person to the commanding officer Ellington Field for duty at that place.

The following-named officers will proceed to Riverside, Calif., and report in person to the commanding officer March Field for duty: George W. Puryear, Daniel F. Hunter, John T. Lawson, Thomas J. Guy, Jesse A. Madarasz, Paul L. Williams and Cutter P. Davis.

Second Lieut. John T. Eagleton is transferred to United States Army General Hospital No. 41, Fox Hill, Staten Island, N. Y.

First Lieut. Julian C. Stanley will report to United States Army Air Service Hospital, Cooperstown, N. Y.

First Lieut. Norman K. Berry is transferred to the United States Army Air Service Hospital, Cooperstown, N. Y.

Second Lieut. Frederic L. Gallup will proceed to Detroit, Mich., reporting to the commanding officer Aviation General Supply Depot for discharge.

Lieut. Col. Joseph T. McNarney, junior military aviator, will proceed to Godman Field, Camp Knox, Stithton, Ky., take station, assume command, and report by letter to the Director of Air Service, Washington, D. C., for duty.

First Lieut. Frank W. Wells will proceed to Detroit, Mich., report in person to the commanding officer Aviation General Supply Depot.

Maj. John G. Thornell will proceed to Hampton, Va., and report in person to the commanding officer Langley Field.

First Lieut. Jesse W. Simpson will proceed to Middletown, Pa., and report in person to the commanding officer Aviation General Supply Depot.

Maj. Edward L. Hoffman, junior military aviator, will proceed to Dayton, Ohio, and report in person to the Chief, Engineering Division, Air Service.

Maj. John C. McDonnell, junior military aviator, will proceed to Aberdeen Proving Grounds, Aberdeen, Md., take station, assume command of Air Service troops at that station and report by letter to the Director of Air Service, Washington, D. C.

Maj. Cushman A. Rice will proceed to Cooperstown, N. Y., to the commanding officer military hospital for observation and treatment.

Col. William H. H. Hutton, Jr., will proceed to Louisville, Ky., for the purpose of carrying out the verbal instructions of the Chief of Staff in connection with the delivery of distinguished service medal awarded Lieut. Col. E. V. Sumner, deceased.

Lieut. Col. Ralph Royce, junior military aviator, will proceed to Fort San Houston, Tex., Southern Dept., on temporary duty in the office of the department Air Service officer in connection with reorganization of Air Service troops.

First Lieut. Jesse B. Howe will proceed to San Antonio, Tex., to Aviation General Supply Depot.

Capt. Ormsby McCammon will proceed to Washington, D. C., and report in person to the Director of Air Service for duty.

Maj. Jacob H. Rudolph, junior military aviator, will proceed at once to Caldwell, N. J., and report in person to the commanding officer Air Service Detachment, National Rifle Range, for the purpose of participating in national rifle matches.

Maj. Victor M. Dumas will proceed to Washington, D. C., and report in person to the Director of Air Service for the purpose of conference, not to exceed two days; thence to Hazelhurst Field, Mineola, Long Island, N. Y., for duty.

Maj. Albert D. Smith is transferred to the Letterman General Hospital, Presidio of San Francisco, Calif., for observation and treatment.

Capt. Jesse K. Freeman will proceed to Morrison, Va., and report in person to the commanding officer Air Service Depot for duty.

First Lieut. LeRoy E. Hussell will proceed at once to Caldwell, N. J., and report to the commanding officer Air Service Detachment, National Rifle Range, for the purpose of participating in the national rifle matches.

First Lieut. Jack E. Duke, Jr., will report in person to the Director of Air Service, Washington, D. C., for assignment to duty.

Second Lieut. Stanley Wilson will proceed to Aviation General Supply Depot, Detroit, Mich.

Second Lieut. Carl E. Rollins will proceed to Hazelhurst Field, Long Island, N. Y.

First Lieut. John G. Fleming is detailed for duty with the Motor Transport Corps. He will proceed to Chicago, Ill., and report to the commanding officer, Motor Transport General Depot.

The following-named officers will proceed to the hospitals specified and report in person to the commanding officer thereof for duty:

D. P. A. Willard, United States Army General Hospital No. 19, Oteen, N. C.

Henry F. Wilstrey, Walter Reed General Hospital, Takoma Park, D. C.

Second Lieut. Bert Paul Meyen will proceed to Cooperstown, N. Y., and report in person to the commanding officer United States Army Air Service Hospital for observation and treatment.

Second Lieut. Carrol B. Crossan will proceed to Hazelhurst Field, Long Island, N. Y., and report in person to the commanding officer for duty.

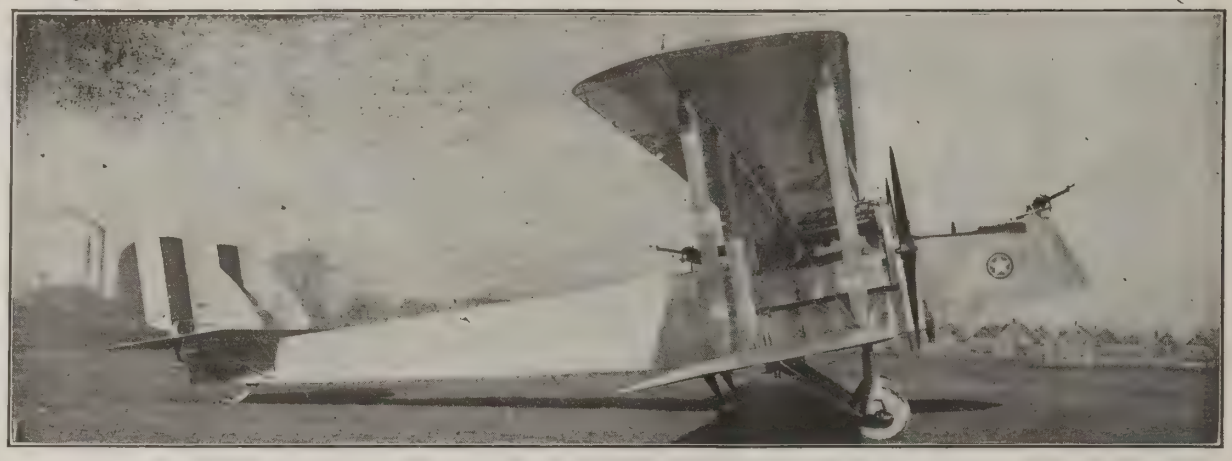
First Lieut. John O. Donaldson will proceed at once to Caldwell, N. J., and report to the commanding officer Air Service Detachment, National Rifle Range, for the purpose of participating in national rifle matches.

Second Lieut. Howard D. Norris will proceed at once to Caldwell, N. J., and report to the commanding officer Air Service Detachment, National Rifle Range, for the purpose of participating in national rifle matches.

Second Lieut. George G. Cressy will proceed to Middletown, Pa., and report in person to the commanding officer, aviation general supply depot, for duty. The travel directed is necessary in the military service.

Paragraph 25, Special Orders, No. 142-O, War Department, June 18, 1919, relating to First Lieut. Samuel M. Lunt, Air Service (Aeronautics), is hereby revoked.

Second Lieut. William Prickett is announced as being on duty requiring him to participate regularly and frequently in aerial flights from November 26, 1917, to May 17, 1918, inclusive.



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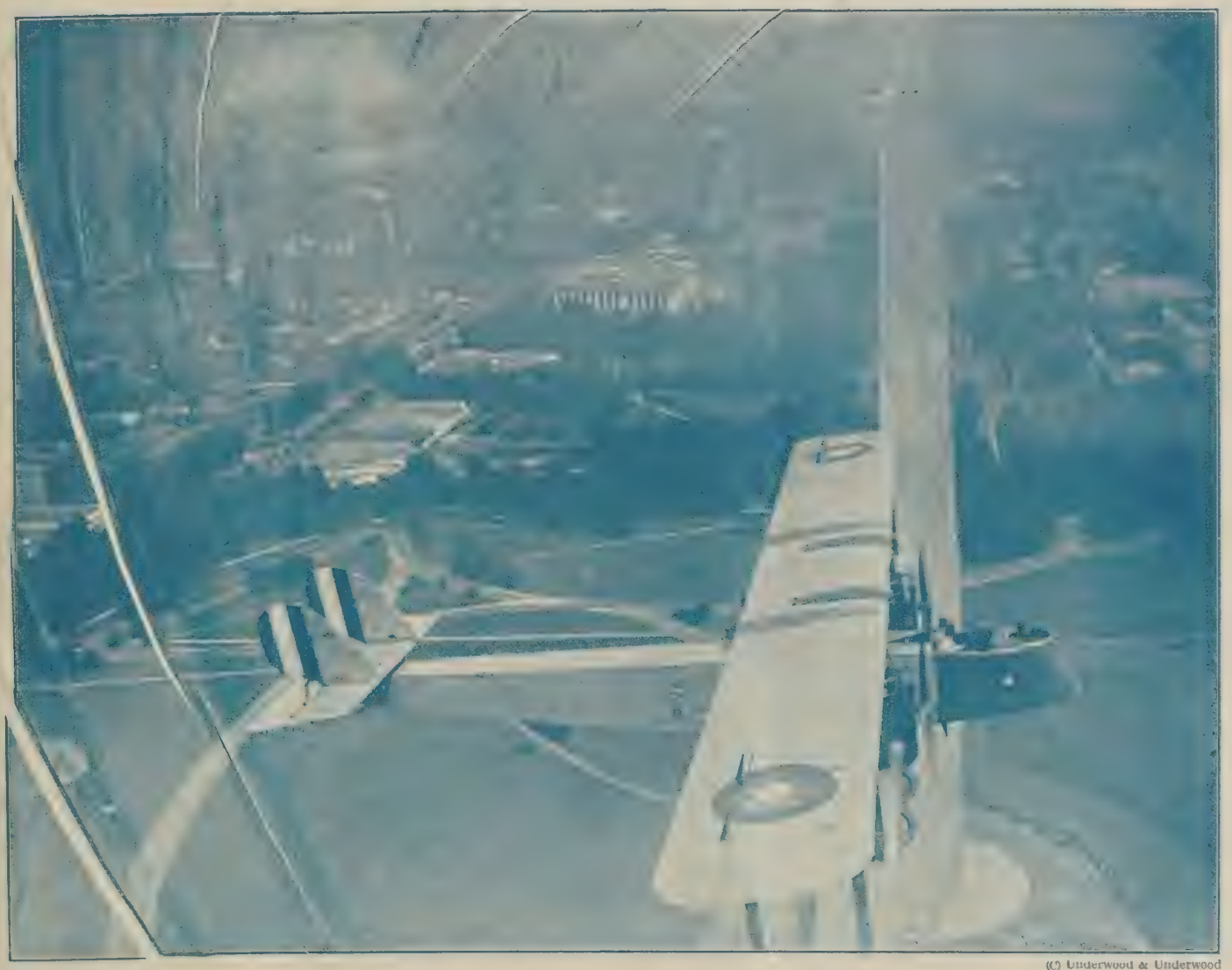
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AMERICAN PROPELLER & MFG. CO.,

BALTIMORE, MD., U. S. A.

AERIAL AGE WEEKLY

Vol. 9, No. 22 AUGUST 11, 1919 10 CENTS A COPY



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A Remarkable View of the Glenn L. Martin Bomber Passing the Washington Monument in the National Capital

Trans-Continental Aerial Mail Proposed

PUBLISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY
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VOL. IX NEW YORK, AUGUST 11, 1919 NO. 22

TRANS-CONTINENTAL AERIAL MAIL PROPOSED

CONGRESSMAN JULIUS KAHN introduced in the House of Representatives on July 30 a bill for the establishment of aeroplane mail service between New York and San Francisco. The terms of the bill are as follows:

"Be is enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Postmaster General be, and he is hereby, authorized to expend, out of any unappropriated balance of the appropriation 'for inland transportation by railroad routes and aeroplanes,' appropriated by the Act entitled 'An Act making appropriations for the service of the Post Office Department for the fiscal year ending June 30, 1920, and for other purposes,' approved February 28, 1919, for the purchase of aeroplanes and the operation and maintenance of aeroplane mail service between the cities of New York, State of New York, and San Francisco, State of California; and the Postmaster General is authorized to designate such additional points between said cities as he may deem necessary or advisable for the operation and maintenance of an aeroplane mail service between said additional points, to be included in the service to and between said cities of New York, New York, and San Francisco, California."

BILL INTRODUCED TO ESTABLISH A DEPARTMENT OF AERONAUTICS

CONGRESSMAN CURRY of California introduced a Bill in the House of Representatives on July 28 which is designed to establish a Department of Aeronautics. The Bill follows:

A Bill to Establish the Department of Aeronautics, and for other Purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be at the seat of government an executive department to be known as the Department of Aeronautics, and a Secretary of Aeronautics, who shall be the head thereof, who shall be appointed by the President, by and with the advice and consent of the Senate, who shall receive a salary of $12,000 per annum, and whose term and tenure of office shall be like that of the heads of the other executive departments, and section 158 of the Revised Statutes is hereby amended to include such department, and the provisions of title 4 of the Revised Statutes, including all amendments thereto, and hereby made applicable to said department.

The said Secretary shall cause a seal of office to be made for the said Department of Aeronautics of such device as the President shall approve, and judicial notice shall be taken of the said seal.

SEC. 2. That there shall be in said Department of Aeronautics an Assistant Secretary of Aeronautics, to be appointed by the President, by and with the advice and consent of the Senate, who shall receive a salary of $5,000 per annum. He shall perform such duties as shall be prescribed by the Secretary or required by law. There shall also be one assistant and chief clerk and a disbursing clerk, and such other clerical assistants as may be required from time to time and authorized by the Secretary. Until such time as an Auditor for the Department of Aeronautics may be authorized by law the Auditor for the War Department shall receive and examine all accounts of salaries and incidental expenses of the office of the Secretary of Aeronautics, and of all divisions and offices under his direction, and certify the balances arising thereon to the Division of Bookkeeping and Accounting of the Treasury Department, and send forthwith a copy of each certificate to the Secretary of Aeronautics.

SEC. 3. That it shall be the province and duty of said Department of Aeronautics to foster, develop, and promote all matters pertaining to aeronautics, including the purchase, manufacture, maintenance, and production of all aircraft for the United States and to perform all duties heretofore assigned to the War, Postoffice, and Navy Departments in so far as they relate to aviation, which shall include the supply of personnel and equipment for aerial mail routes, the preparation of aerial photographs, and the granting of aviators' and aeronauts' licenses to civilian pilots, and the promulgation of rules and regulations to govern such aviators and aeronauts; the supervision and establishment of aerial landing fields, including the supervision of those used for commercial purposes; the furnishing of personnel and equipment for coast, border, and forest reserve patrol, the instruction, training, and equipping of air forces for the national defense, and the development of heavier and lighter-than-air aeronautical material, and fostering such development for commercial purposes; to establish and maintain an aeronautical academy and such aircraft factories as may be hereafter authorized by law; and to this end it shall be vested with jurisdiction and control of departments, bureaus, offices, and branches of the public service hereinafter specified, and with such other powers and duties as may be prescribed by law: *Provided,* That the Secretary of Aeronautics shall submit to the Congress not later than six months after the passage of

this Act detailed estimates for the establishment of an aeronautical academy for the training of cadets in the science of aeronautics, who shall be commissioned in the regular air force when graduated, and for the establishment of such aircraft factories as may be required for the manufacture of aeronautical equipment and material.

SEC. 4. That all unexpended appropriations which shall be available at the time when this Act takes effect in relation to the various offices, bureaus, divisions, and other branches of the public service, which shall by this Act be transferred to or included in the Department of Aeronautics, or which may hereafter, in accordance with the provisions of this Act, be so transferred and such proportionate part of any unexpended balances of appropriations as the War Department and the Navy Department would have been required to expend for the pay and allowances on account of officers, enlisted men, and civilian employees transferred to the Department of Aeronautics by this Act, including medical attendance, transportation, housing, subsistence, clothing, and any other items not specially set aside for aviation purposes shall become available, from the time of such transfer, for expenditure in and by the Department of Aeronautics and shall be treated the same as though said branches of the public service had been directly named in the laws making such appropriations as parts of the Department of Aeronautics, under the direction of the Secretary of the said department. The Secretary of War, the Secretary of the Navy, and the Postmaster General shall, and are hereby directed, by order in writing, to transfer and deliver to such agents of the Department of Aeronautics as the secretary thereof may designate, all aircraft, including airships, hydroplanes, hydroaeroplanes, seaplanes, balloons, and any other means of transportation, including ships, vessels, boats, and automobiles or other motor vehicles, now in ues or on hand, and all material and parts, and all machinery, appliances, and equipment held for use for the maintenance thereof, all lands, docks, wharves, buildings, repair shops, warehouses, and all other property heretofore used by the Department of War, Department of the Navy, and Postoffice Department in, or in connection with, the operation, maintenance, and manufacture of aircraft, or procured and now held for such use by or under the jurisdiction and control of these departments.

SEC. 5. That the following named offices, bureaus, divisions, and branches of the public service, now and heretofore under the jurisdiction of the War, Navy, and Postoffice Departments, and all that pertains to the same, known as the Aviation Section of the Signal Corps, the Division of Military Aeronautics, the Bureau of Aircraft Production, the Air Service of the Army, the Motor Transport Corps, the Naval Flying Corps, the Marine Corps Flying Corps, and the Aerial Mail Service, and any and all other branches of the public service which has been heretofore charged with matters pertaining to aviation be, and the same are hereby, transferred from the War, Navy, and Postoffice Departments to the Department of Aeronautics, and the same shall hereafter remain under the jurisdiction and supervision of the last-named department and the Secretary of Aeronautics is hereby given the power and authority to rearrange the work of the offices, bureaus, and divisions confided to such departments, and to consolidate any of the offices, bureaus, and divisions transferred to said department. The official records and papers now on file in and pertaining exclusively to any bureau, office, department, or branch of the public service in this Act transferred to the Department of Aeronautics, together with the furniture now in use in such bureau, office, department, or branch of the public service, shall be, and are hereby, transferred to the Department of Aeronautics.

SEC. 6. That all clerks and employees of the War Department, the Navy Department, the Postoffice Department, or other bureau, office, department, or branch of the public service engaged or on duty exclusively pertaining to aviation and aeronautics shall be, and are hereby, transferred to the Department of Aeronautics at their present grades and salaries.

SEC. 7. That the air force of the United States shall consist of the Regular Air Force, the Reserve Air Force, the National Guard Air Force, while in the service of the United States, and such other air forces as are now or may hereafter be authorized by law.

SEC. 8. That the Regular Air Force of the United States shall consist of such squadrons, groups, wings, or other units designated by the Secretary of Aeronautics, to be known as the Line of the Air Force, an Operations Division, an Administration Division, a Legal Division, an Engineerng Division, a Supply Division, and a Medical Division, to be known as the Staff of the Air Force, within the limitations of this Act. The Line of the Air Force shall be so trained as to comprise a combatant force of the United States with a view to operating with the armed land and sea forces of the United States while in actual combat, and such other duties as the Secretary of Aeronautics may prescribe. The President shall be, and is hereby, authorized to assign such units of the Department of Aeronautics as may be necessary for cooperation with the armed land and sea forces of the United States in time of war or threatened hostilities and during maneuvers, target practice, and such other exercises as may be held by those forces: *Provided*, That in time of war or threatened hostilities, when such units are so assigned, they will be under the command of the designated commander of the land or sea forces, or both, as the case may be.

SEC. 9. That the duties of the Operations Division shall be to prepare plans for the national defense and for the mobilization of the air forces in time of war, to investigate and report upon all questions affecting the efficiency of the air force and its state of preparation for military or naval operations, to render professional aid and assistance to the Secretary of Aeronautics and to general officers and other superior commanders and to act as their agents in informing and coordinating the action of all the different officers who are subject under the terms of this Act to the supervision of the Chief of Operations, and to perform such other aviation duties not otherwise assigned by law as may be from time to time prescribed by the President. The Administration Division is charged under the direction of the Secretary of Aeronautics and subject to the supervision of the Chief of Operations in all matters pertaining to the command, discipline, or administration of the air forces, with the duty of recording, authenticating and communicating to troops and individuals in the air forces all orders, instructions, and regulations issued by the Secretary of Aeronautics through the Chief of Operations, of preparing and distributing commissions, of managing the recruiting service, and publishing and recording such other matters pertaining to aeronautics and the air forces as the Secretary of Aeronautics may direct.

The Legal Division will be charged, under the direction of the Secretary of Aeronautics, with all legal matters pertaining to the Department of Aeronautics, and will be charged with the care of records, and all general courtsmartial, courts of inquiry, and aeronautical commissions, and of all papers relating to the title of lands under the control of the Department of Aeronautics, except the public buildings and grounds in the District of Columbia. The officers of this division will render opinions upon legal questions when called upon by proper authority.

The Engineering Division is charged, under the direction of the Secretary of Aeronautics, with the selection and determining of types and designs of all aircraft equipment and material, including ordnance and communicating equipment and material, and the repair and maintenance thereof; it shall operate and maintain such aircraft factories as may be hereafter authorized by law, and such repair and machine shops as may be authorized by the Secretary of Aeronautics; the production, experimentation, and manufacture; the production, operation, and maintenance of aerial photographic apparatus; preparation of aerial photographic maps of the United States and its Territories and its possessions, and in field operations, of aerial maps of the theater of operations and such other aeronautical engineering duties as may be assigned by the Secretary of Aeronautics.

The Supply Division will be charged, under the direction of the Secretary of Aeronautics, with the duty of providing transportation, clothing and equipage, and barracks, storehouse, hangars, and other buildings; constructing and repairing landing fields and roads; the building, chartering, and operation of ships, boats, docks, and wharves needed for aeronautical purposes; supplying subsistence and articles for sale and issue to those entitled thereto; supplying, distributing, and accounting for funds for the payment of the Air Forces, and such other financial duties as are specially assigned to it; and attending to all other matters connected with supply and accounting which are not expressly assigned to some other division of the Department of Aeronautics.

The Medical Division is charged with the duty of the care of sick and wounded, making physical examinations of officers and enlisted men, the management and control of hospitals, and furnishing all medical and hospital supplies; with the duty of maintaining sanitary conditions for the Department of Aeronautics.

SEC. 10. The President is hereby authorized to appoint and commission in the Regular Air Force, by and with the advice and consent of the Senate, such officers as are hereinafter authorized: *Provided*, That the commissioned strength of the Regular Air Force shall consist of one major general, who shall be Chief of Operations, and, under the direction of

(*Continued on page* 1021)



The News of the Week



Roland Rohlfs Climbs to 30,700 Feet in Curtiss Triplane

An altitude of 30,700 feet was reached by Roland Rohlfs, chief test pilot for the Curtiss Engineering Corporation, according to his barograph, in a flight from Roosevelt Field on July 31. He started the flight at 2:33 P. M. and landed at 5:32 P. M.

The best previous American record was that of Major R. W. Schroeder, U. S. A., who attained an altitude of 28,900 feet in a British-built Bristol machine, Sept. 18, last year. The world's record is claimed in behalf of Adjutant Casale, a French man, who was reported last month to have reached a height of 33,136 feet.

Adjutant Casale's record has not been "homologated," or registered as official by the air societies of the world, although it may be received later. After the flight of Rohlfs the barograph was signed by the official witnesses and sent to the Aero Club of America to be corrected and authenticated. It may stand as the official world's altitude record.

Rohlfs flew a Curtiss Wasp triplane equipped with a twelve-cylinder 400-horsepower Kirkman motor. This machine is known as Type 18-T Triplane, described in the March 31 issue of Aerial Age. He tried out the climbing powers of the machine on July 25 in an unofficial flight, in which he reported reaching a height of 31,000 feet. Numerous witnesses were called to make the flight official, and the barograph was signed by Major J. E. Roessel, Major H. F. Miller, Lieutenant Colonel W. L. Moose, Jr., Captain A. F. Simonin, Colonel Archie Miller, Augustus Post, on behalf of the Aero Club of America; John T. Tarbox, secretary of the Aero Club of America, and the pilot himself.

The barograph record will be exhaustively examined by air experts and mathematicians, to fix the official figures of the height. It was said that study of the record might result in placing the exact altitude achieved anywhere between 30,400 and 31,000 feet.

In one of its early tests it hung up a new record for speed—160 miles per hour, and upon another occasion it broke the climbing record by attaining a height of 16,000 feet in ten minutes. It has a wing span of 32 feet ½ inch and a total supporting surface of 309 square feet. Its overall dimensions are: Width, 32 feet; length, 23 feet 3 inches; height, 9 feet 10½ inches. The machine weighs, empty, approximately 1,900 pounds and carries a useful load of approximately 1,000 pounds. Its minimum speed is 58 miles per hour and its maximum range at economical speed is about 550 miles. The fuselage is streamlined throughout, presenting an almost continuous contour.

It is equipped with one of the new Curtiss twelve 400 horsepower motors, a complete description of which appeared in the February 3 issue of Aerial Age. This is a twelve-cylinder motor with a gasoline consumption of 0.55 pounds per brake horsepower and an oil consumption of 0.03 pounds per brake horsepower. The weight without oil or water is 720 pounds—almost one-quarter less than any other 400 horsepower motor. It has a 4½-inch bore of a 6-inch stroke. In the altitude flight 58 gallons of gasoline and 6 gallons of oil were used.



Roland Rohlfs, chief test pilot for the Curtiss Engineering Corporation, at the start of the flight in which he reached an altitude of 30,700 feet

Spad Flies 259 Miles in 110 Minutes

Mount Clemens, Mich.—Major Reed Chambers made a fast flight from Dayton to Selfridge Field in a Hispano-motored Spad, Model 13. The distance of 259 miles was covered in 110 minutes at an average of 141 miles an hour.

Prize for Around-the-World Flight

Hoquam, Wash.—Deeds to 1,000 acres of Gray's Harbor land, lying within what it has been hoped for years will prove an oil belt, are to be placed in a local bank as a reward for the aviator who first encircles the globe. George J. Hibbard, a Seattle attorney, makes the offer, and has set the time limit for winning the land at August 1, 1920.

Thomas-Morse Biplane in 35-Mile Glide

Ithaca, N. Y.—On August 2, accomplishing the longest glide on record, "Rex" Marshall attained an altitude of 17,000 feet, shut off the engine of his Thomas-Morse machine at the northern end of Cayuga Lake and glided thirty-five miles to this city, renewing his power at an altitude of 6,000 feet. Twenty-two miles is said to be the former record.

Supercharger Sets High Altitude Speed Record

Dayton, Ohio.—Major R. W. Schroeder, army aviator, on August 2, set a new world's record for high altitudes, it is claimed, when he flew at a rate of 137 miles an hour at a height of 18,400 feet. He used a two-seated Lepere biplane, designed by Captain Lepere of the French army. It was equipped with a twelve-cylinder Liberty motor and a supercharger. Lieutenant G. W. Elfey, expert aeronautic observer, was a passenger.

According to Captain B. G. Patterson, this development will have a marked effect on aerial navigation, because it will enable a pilot to fly at full speed and full power above the storm zone. It will also be potent in trans-oceanic flights and would make easy non-stop trips between New York and Chicago, regardless of weather conditions.

The supercharger is an attachment consisting of a gas turbine and centrifugal compressor, deriving its power from the



The Curtiss "Wasp" Triplane with which Roland Rholfs established a new official World's Altitude Record of 30,700 feet. Machine has a span of 32 feet, is 23 feet long, and weighs 1900 lbs. The engine is a Curtiss "12" rated at 400 H. P.

red-hot exhaust gases of the motor. It feeds the compressed air into the carburetor at the same pressure as at sea level, so there is no lack of oxygen regardless of altitude.

Hydro-Aeroplane Saves Drowning Swimmer

Patchogue, L. I.—W. D. Walton, who has been piloting a hydro-aeroplane in this vicinity, took part in the first hydro-aeroplane rescue since the war. While tuning up his plane for a flight his attention was called to a group struggling about an upturned boat, just discernable in the waters of the bay.

Half an hour later Mr. Walton returned with two dripping passengers, Miss Grace Flaherty of Laurel Hill, N. J., and H. V. Fajans of New York. A sailboat following behind bore a third moistened person, J. Stuart Blackton, Jr., son of the New York yachtsman and motion picture producer.

110 Minute Flight from Washington to New York

Washington. — Washington to New York by aeroplane in less than two hours was reported to the Air Service on July 29. Pilot Lieutenant Patrick H. Logan, with a passenger, Major William Conant, covered the 200 miles to Hazelhurst Field, L. I., in 110 minutes, averaging approximately 110 miles an hour.

Among the reports from various air stations received is one from Park Field, Tenn., showing a speed of 120 miles an hour, or two miles a minute for a distance of 160 miles. Pilot Lieutenant J. S. Marriott made the flight in a De Haviland four, carrying a passenger from Park Field to Jackson, Tenn., and return.

Passport Required for Flights to Cuba

Washington, D. C.—Passports are required for flights to foreign countries from American territory, as for instance, between the United States and Cuba. Section G. O. No. 76, W. D., Jan. 26, 1917, has been modified to include transportation to foreign countries by aeroplane as well as ships.

Pasadena Establishes Municipal Landing Field

Pasadena, Cal.—Pasadena has established a municipal landing field near the Altadena Country Club covering sixty acres. It has all the equipment of a first-class landing field.

Yakima, Washington, Has Up-to-Date Landing Field

Spokane, Wash.—The civilian aviators of Yakima, Wash., have added that city to the list of cities which have up to date aeroplane landing grounds. The Commercial Club obtained permission to use the acreage belonging to the Northern Pacific near the city limits as a site. The field will be properly marked and improved. Ernest Schneider, owner of a plane at Yakima, says he will erect a hangar on it. The club is to pay $10 yearly rental and the taxes for the use of the place.

Lieut. R. P. Parshall, Yakima aviator, is planning a flight around Mount Adams. He will carry as a passenger on the flight, which is under the auspices of the Commercial Club, C. E. Rusk, who has frequently climbed the mountain and been a leader in efforts to have it made a part of the proposed Yakima national park. Mr. Rusk is to be given an opportunity to take the first pictures from a plane of the mountain. The trip will require two days, one being taken in a preliminary flight to Glenwood.

Seeks to Prevent Flights Over Ranch

Kansas City.—Whether a property owner is also owner of the air above his land is to be determined through a court action brought by Frederick Hoenemann, a farmer. He seeks to restrain a company owning aeroplanes from using the air above his farm.

Hoenemann contends that the sight of the machines and the noise of their engine disturb the livestock.



From left to right: A. L. Allan, Curtiss pilot; E. L. Ovington, President of the Curtiss Flying Station, Atlantic City, and N. B. Stratton, N. W. Moore, J. W. Forse, Vice-President, Treasurer and Secretary of the Curtiss Aeroplane and Motor Co., respectively, at Atlantic City Flying Station

LePere Makes Record Flight in Florida

In a LePere, flying at an altitude of 6,000 feet, Lieutenant J. D. Corkille, with Sergeant J. R. Cook, made a flight from Arcadia to Daytona Beach on August 1, a distance of 186 miles, in 75 minutes, rate 148.8 miles per hour.

Lieutenant R. H. Smith, pilot in a De-Haviland 4, made a flight from Arcadia to Jacksonville, 265 miles, in 127 minutes, at an elevation of 5,000 feet. A new record for Florida. Passengers: Lieutenants W. L. Williams and R. J. Johnson.

Air Service Congratulates Wright

Washington, D. C.—The following telegram was sent by the Air Service to Orville Wright on July 30:

"The congratulations of the Air Service are extended to you on the tenth anniversary of the delivery of the first aeroplane to the Government of the United States, first in the world to acquire a dynamic air craft. The Air Service appreciates to the full the ever increasing debt owed by mankind to the Wright Brothers, whose foresight, indefatigable research and practicable application have aided the world progress through the invention of a new means of communication.

"MENOHER."

It will be recalled that ten years ago, on the 30th of July, the United States acquired the first aeroplane. This Government was the first in the world to be the possessor of an aeroplane, but had, however, no pilots. Later in the season the following American Army officers were taught to fly by Wilbur Wright: 1st Lieut. Frank P. Lahm, now Colonel, and 1st Lieut. B. D. Foulois, now Brigadier-General.

On July 30, 1909, Orville Wright and B. D. Foulois together made the second and final flight with the Wright machine contracted for by the Government the year before. This was a cross-country trip of five miles in each direction with and against the wind. The speed made was 42 miles an hour. On July 27 the endurance test of one hour was made in a flight which totaled 72 minutes, with 1st Lieut. Frank P. Lahm. Lieut. Lahm has the distinction of being the first American Army officer to fly.

While the Wright Brothers were negotiating in foreign countries for the sale of patent rights, they were communicated with by the United States Government, and in the winter of 1907 the Chief Signal Officer, General James Allen, advertised for bids for an aeroplane. Of 22 bids three were accepted. The Wright Brothers were the only ones to deliver a machine. In September, 1908, official demonstrating flights were begun at Fort Myer, near Washington, in the fulfillment of the contract, but the death of 1st Lieut. Thos. E. Selfridge, passenger, and the accident to Orville Wright, the pilot of the machine, postponed flights until 1909. Lieut. Selfridge was the first man in the world to be killed by a power-driven aeroplane.

The contract price of the machine was $25,000. The maximum speed demanded was 40 miles an hour, with a bonus of 10 per cent for each mile per hour in addition. The Wrights received $30.000 for a speed of 42 miles per hour. This was paid out of the funds of the Board of Ordnance and Fortification.



Travellers Company Starts New York-Atlantic City Air Transport Service

An air line carrying passengers between New York and Atlantic City, the first of its kind in this country, was inaugurated on July 25 at 11 A. M., when a flying boat with glassed-in body left the Hudson River at Ninety-sixth Street, on the 105-mile trip down the Jersey coast.

The flying boats are operated by the Travellers Company, composed of three young aviators who spent several hundred hours in the air in the British or American air service. The "limousine" flying boats are of 150 horse-power, have a speed of 75 miles an hour and can carry two or three passengers besides the pilot. Bookings will be made from the Waldorf, McAlpin and Claridge hotels, and passengers will go to the Hudson River by automobile from the hotels. The fare is $100 each way, and passengers are allowed thirty-five pounds of baggage.

The seaplane, according to the prepared schedule, will leave New York at 11 A. M. and arrive in Atlantic City at 12:30 P. M. The return trip will start at 3 P. M., and the Hudson should be reached by 4:30 P. M. Tests made on several days show that this schedule can be maintained, it is stated. The pilots are Robert B. Hewitt and Charles Todd Seims, and the passenger agent is C. Nicholas Reinhardt.

Zenith Increases Capitalization

Detroit, Mich.—The Zenith Carburetor Co. of Detroit has increased its capitalization from $40,000 to $320,000, of which $180,000 has been taken up by its present stockholders. The balance will not be issued at present. The real estate, buildings and other assets owned by the French corporation of the Zenith Company will be purchased with the new money.

Aircraft Materials Opens Chicago Branch

New York, N. Y.—The Aircraft Material and Equipment Corporation of New York has opened a branch office in Chicago in the Westminster Building. An additional branch will be opened in San Francisco, it was announced by M. W. Hanks, president of the corporation. The company carries spares for Canadian training planes.

Electric Tools for the Aircraft Industry

Baltimore, Md.—The Black & Decker Mfg. Co. of this city have prepared a handsome and comprehensive catalog describing their line of electric drills, air compressors and valve grinders. These tools are of the well-known standard quality of this company, and are of interest to the aircraft industry in connection with construction and repair of motors and maintenance of tire pressure.

Air Service to Sell Unserviceable Planes for Instruction Purposes

Washington, D. C.—According to an announcement from the office of the Director of the Air Service, the Air Service has an accumulation of miscellaneous aeroplane motors and unserviceable aeroplanes, which were used for instruction purposes at the various training camps and schools. It has been decided to offer these motors and aeroplanes to all colleges and schools desiring to teach aeronautical engineering, and prices have been fixed commensurate with their value for this purpose.

Although the motors are unserviceable for flying, all moving parts are complete. The prices range from $250 for Liberty and Hispano-Suiza engines to $75 for Lawrence engines. Le Rhone, Hall Scott, Mercedes, Thomas-Morse, Gnome, Renault, Clerget, and Sturtevant engines are included in the sale.

Glenn Martin R, Standard J-1, De Haviland and Thomas-Morse aeroplanes, without motors and instruments and unserviceable for flying are being sold for $250.

Pan-American Aircraft Co. Carrying Passengers in Pennsylvania

Norristown, Pa.—The Pan-American Aircraft Co. of this city is now carrying on a passenger carrying and exhibition business in Pennsylvania. Their present equipment consists of several Curtiss biplanes. Mr. Russel Brownback, formerly an officer in the infantry, is president of the company. Mr. Alfred Wainwright, vice-president, was in charge of machine-gun assembly for the Air Service during the war. The secretary and treasurer of the company, Mr. Howard R. Watt, was officer in charge of salvage at the aviation repair base at Dallas, Texas. Mr. Harry L. Brownbeck, chief engineer, served the Bureau of Aircraft Production in several capacities, including that of special representative of the Bureau in a tour of inspection of European aircraft factories.

The company had definite plans for expansion and will undertake the construction of aircraft in the near future.

Largest Shipment of Commercial Planes Made to New York

The largest commercial shipment of aeroplanes ever received in New York arrived recently when a trainload of machines reached here from Taylor Field, Montgomery, Ala., for the Curtiss Aeroplane and Motor Corporation. They will be assembled at Roosevelt Field, L. I., one of the concentration points for the distribution of planes purchased from the Government by the Curtiss Company. The shipment was made by express and consisted of thirty planes which have been sold to private purchasers who will use them for exhibition, passenger-carrying and pleasure-flying. They are the JN type, used by the American and Canadian governments in training army aviators. Another large shipment is now being made to Wilbur Wright Field, Dayton, Ohio, consisting of 40 machines. Since the purchase of machines from the Government the Curtiss Company has disposed of nearly 500 planes, which are now in operation in various parts of the United States. The Curtiss Company is establishing service stations at all of the larger concentration points and each machine that has been in use is being thoroughly overhauled and tested before it is allowed to be delivered to the customer.

British Aircraft Linen to Be Sold in U. S.

About 8,000,000 yards of the 43,000,000-yard purchase of aircraft linen which Leonard J. Martin recently made of the British Government will be sold in the United States to large and small purchasers. No effort is to be made to dye or bleach the material.

Canadian Firm Develops New Alloy

Montreal, Canada.—The Shawinigan Electro-Metals Co. of Montreal is said to have developed a new magnesium alloy particularly adapted to aircraft use. It is stated that the new product has but two-thirds the weight of aluminum and is as strong as steel. It is particularly suitable for use in the construction of pistons and connecting rods of aircraft motors.

South America Purchasing Curtiss Planes

The first foreign shipment of aeroplanes since the war was made recently when the Curtiss Aeroplane and Motor Corporation sent two land machines of the JN type and one water machine of the Seagull three-passenger type to Rio de Janeiro. The shipment was made on the steamer Saint Bede of the Lamport and Holt line.

It is the advance guard of the mission which the Curtiss Company is sending to South America for the purpose of demonstrating American-made aeroplanes to the Latin-American governments, corporations and people.

Orton W. Hoover, one of the first and best-known pilots in the United States, left at the same time to set up the machines and to demonstrate them.

Another shipment will be made on the steamer Frankmere of the same line, to Beunos Ayres, in a few days. This will consist of four JN.'s and one Seagull.

C. W. Webster, South American sales representative of the Curtiss Company, will sail on August 23 on the steamer Vasari, taking with him two three-passenger Oriole land machines, the first purely commercial plane developed.

Lawrence Leon, another well-known pilot who trained many army fliers during the war, is already at Buenos Ayres.

Headquarters will be established at Rio de Janeiro and Buenos Ayres at first, but the mission plans to give demonstrations in all of the South American countries. James Honor and Roy Schneider, two Curtiss mechanicians, are accompanying the party.

The Bolivian government has already received a Curtiss Wasp—the type of machine in which Roland Rohlfs, Curtiss test pilot, recently established a new American altitude record. It is equipped with a Curtiss twelve 400 horsepower motor and with overhanging wings. It will be used for training purposes. The Wasp was built as a two-place fighting machine and has a speed record of 160 miles an hour and a climbing record of 16,000 feet in ten minutes. It is exceptionally adapted to work in high altitudes.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative

PILOTS

Dana C. DeHart
Edward V. Gardner
Eber H. Lee
John M. Miller
Leon D. Smith
Max Miller
Charles E. Bradley
Lester F. Bishop
Harold T. Lewis
Leslie E. Stancill
Charles Hugh Anglin
John H. Skoning
Earl F. White
Charles W. Lamborn
Frank H. Crozier
Walter H. Stevens

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

New Schedule for New York-Washington Aerial Mail

Through an arragnement made between the Air Mail Service, Postmaster Chance of Washington and Postmaster Patten of New York, a change has been made in the air mail schedule between New York and Washington by which the mail from New York and New England will reach Washington in time for the early afternoon delivery; and the mail from Washington and southern connections to New York will reach that city around 1 o'clock.

The air mail will hereafter leave New York at 8:40 A. M., arriving in Washington at 11 A. M. Operating on this schedule all New York City mail which reaches the postoffice too late for the midnight train for Washington and all New England mail reaching New York between midnight and 8 A. M. will be carried by aeroplane to Washington.

The mail aeroplane will leave Washington at 10 A. M. carrying Washington City mail and mail brought in by the Atlantic Coast Line and Seaboard Air Line and their connections from the South, the mail reaching New York about 1 o'clock for middle afternoon delivery.

The aeroplane left New York on the morning of July 30, under the new schedule at 8:45 with between 12,000 and 13,000 letters from New York and New England, arriving in Washington at 10:55 A. M. and was being distributed by 11:30 A. M.

"The New York and New England mail," said Postmaster Chance, "went out on the 12:20 P. M. city delivery. It is extremely gratifying to be thus able to give the Washington public the benefit of a service many hours earlier by this adjustment of the air mail schedule. The New England mail is advanced about 16 hours and all mail from New York left over from the midnight train is in time for the first afternoon delivery in Washington. Public appreciation of this improvement of the service finds expression in many commendations from people in Washington which I receive."

Alaska-Seattle Mail Route

From present indications it appears practically certain that the next eighteen months will see the establishment of the Alaska-Seattle Aerial Mail Service. The Post Office Department has promised the service to Alaska in 1920, and the post office appropriation bill expressly states that money appropriated may be used for an Alaska service. This is due directly to the joint efforts of W. E. Boeing and E. N. Gott of the Boeing Aeroplane Company, who have furnished the Post Office Department with charts, showing courses, distances, landing stations, where fuel could be obtained at present, and a general resume of all foreseen contingencies.

It is possible that this service may be obtained this coming year, if a large amount of enthusiasm should be made manifest by the people of Alaska to the Post Office Department. Chambers of commerce in Alaskan cities and business firms having an interest in the advancement of commercial relations in Alaska should petition the Post Office Department for the early establishment of this service.

As the time required to make the trip by seaplane is a daylight trip against four days by steamer, the possibilities of a commercial passenger and light express service are also very great. Such an opportunity will be quickly seized. An aerial service to Alaska can be maintained for at least eight months without interruption, and for the remaining four months, with certain delays due to weather conditions. Flying at an altitude of three thousand feet, an aviator can at any point along the route, in case of engine failure, glide down to protected water. Even this contingency is eliminated in the use of twin motored machines, such as are being used at present on the Paris-London route.

Thus, enthusiasm is all that is needed to start the Alaska-Seattle Aerial Mail Service.



Air Mail Pilot E. Hamilton Lee served as stunt flying instructor during war

Superintendent Appointed for Aerial Mail Station at San Francisco

San Francisco, Cal.—According to a statement appearing in the San Francisco *Bulletin*, an aerial mail service between New York and San Francisco will be in operation at no distant date.

A regularly established aerial mail service between San Francisco and Los Angeles and San Francisco and Seattle in the immediate future is assured.

An aerial mail service station, with hangars, supply, repair and machine shops, will be established and maintained in San Francisco.

In charge of the maintenance and operation of the Aerial Mail Service of the United States, already appointed to the position, will be a San Francisco man, Edward McGrath, chairman of the Postal Censorship Committee in New York during the war, just prior to which he was Assistant Superintendent of Railway Mails in Boston, and for many years was Superintendent of Railway Mails in San Francisco.

Aero Mail Pilots Receive Increase

Washington, D. C.—One of the terms of settlement of the aerial mail pilots' strike was an increase of pay by the granting of $3 per day allowance while aviators are on duty away from home.

The terms of settlement are reported to be as follows:

1. The pilots who were summarily dismissed because they refused to make an ascent in the face of dangerous weather were upheld, when the situation was made clear. One was reinstated.

2. The orders applying to airmail flights were amended, giving to the district manager or superintendent the say whether the conditions were right for flying, instead of ordering flights from Washington without knowledge of exact local conditions.

3. The pilots, whose salaries now run from $2,000 to $3,600 a year for their hazardous work, get a raise in salary, or rather an extra allowance of $3 a day while they are away from home.

1500 American Legion Posts Already Organized

According to a recent statement, already more than 1,500 posts of the American Legion have been organized. New York state leads with 130 posts. All men who wore the uniform for at least fifteen days between April 7, 1917, and November 11, 1918, are eligible to membership, unless they were conscientious objectors. National headquarters are in New York City. Lieut.-Col. Theodore Roosevelt, Col. Henry D. Lindsey and Col. Eric Fisher Wood.

THE IMBER SELF-SEALING GASOLINE TANK

By GEORGE F. McLAUGHLIN, A. M. E.

NUMEROUS attempts have been made to perfect a gasoline tank which would be proof against leakage in the event of being punctured and proof against fire when pierced by incendiary bullets or other projectiles. Before such a device was perfected for use in aircraft, approximately 75% of the fatalities could be directly attributed to the fact that the fuel tanks were pierced and the leaking gasoline became a source of danger. Mr. Jack Imber of London, England, undertook to study the requirements of a self-sealing tank and his researches led to some remarkable discoveries.

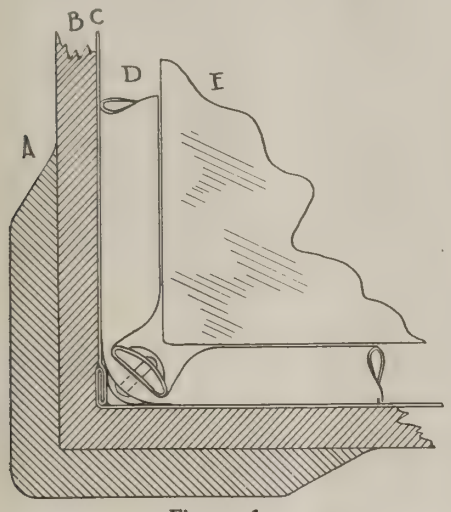


Figure 1

Detail of a corner of the Imber Self-Sealing Gasoline Tank. A—*Rubber reinforcing;* B—*Rubber covering;* C—*Outer shell or casing;* D—*Framework members;* E—*Baffle plate.*

A small bullet can inflict extensive damage when passing through a gasoline tank. In many cases it is found that an ordinary bullet will tear a hole six or eight inches in diameter in the side of the tank opposite to that through which the bullet enters. This phenomenon perplexed most of the inventors who were seeking a remedy to keep the gasoline from leaking from bullet holes. Most of the devices failed for either they were too heavy or some important detail of the structure was not properly disposed because of an unfamiliarity with the actual forces existing in a tank under such circumstances.

Before going on with a detailed description of the tank invented by Mr. Imber it might be well to present the theories upon which the invention is based. A bullet entering the fuel tank makes an aperture as large in diameter as the bullet itself. It leaves a clean hole which is easily sealed by the rubber covering. In emerging, however, a relatively large hole is torn in the metal. Investigation showed that the larger hole was due to the enormous pressure of fuel against the far side of the tank. Upon entering the tank the progress of the bullet is somewhat arrested by the liquid but in its travel through the tank the pressure of the liquid increases both in area and force from the point of entering to a distance of approximately 2'-6". Thus, when a bullet travels through a tank of large diameter its momentum is checked before it goes entirely through, while on the other hand in a tank of ordinary size it is found that up to a certain point the further one side wall is from the other, the larger will be the hole torn upon the exit of the bullet.

It was readily seen that the pressure generated in the tank would either have to be confined or released. Many inventors sought to confine the pressure but results showed that when the bullet made its exit the pressure sought exit through the aperature made by the bullet and in its effort to escape an enormous rupture is made in the tank.

Having acquired a knowledge of the action taking place in a gasoline tank when it is pierced Mr. Imber was in a position to seek a means of perfecting a tank to such a degree that not only would it prevent leaking when pierced but which would also prevent the escape of the liquid in the event of a bad crash. Tanks which had a small measure of success in stopping simple gasoline leakages utterly failed to retain the liquid when a machine crashed. It is this latter feature that specially commends itself to the present designers of commercial aircraft for it is well known that many crashes that in themselves do not result seriously are disastrous only because the tank was not constructed to withstand the strain of a damaging impact, with the result that fire follows.



Figure 3

Method of crossing the tubular members of the Imber tank framework and of securing them to one another with rivets

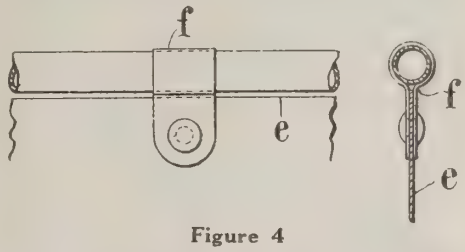


Figure 4

Clips used to secure baffle plates to the inner framework of the Imber tank

The Imber principle allows the air to escape by providing the tank with a resilient outer rubber covering so that when the inside pressure exceeds a certain point the tank yields and the rubber stretches out from the side of the tank under pressure. Naturally, the highest point on the stretched rubber covering is that through which the bullet makes exit and the rubber being stretched makes this point also the thinnest portion of the covering so that when the bullet leaves and the pressure is relieved the rubber goes back to its former shape completely closing up and sealing the bullet hole.

When the Imber tank made its appearance some experimenters suggested the use of angular section braces for framework and diaphragm or baffle plate supports. Failures resulted, due to the fact that when the metal brace was bent outward against the covering it required an equal amount of pressure from the outside covering to force the frame back in place and allow the rubber covering to assume its normal position. The aluminum tubing employed by Imber after being bent outward is easily brought back into place with a great deal less pressure than that required to bend it outward in the first place. The elasticity of the rubber covering is sufficient to force the bent tubular members back in place so that the bullet hole is closed but in cases where other inventors used angle frames, the rubber covering was torn by the unyielding metal.

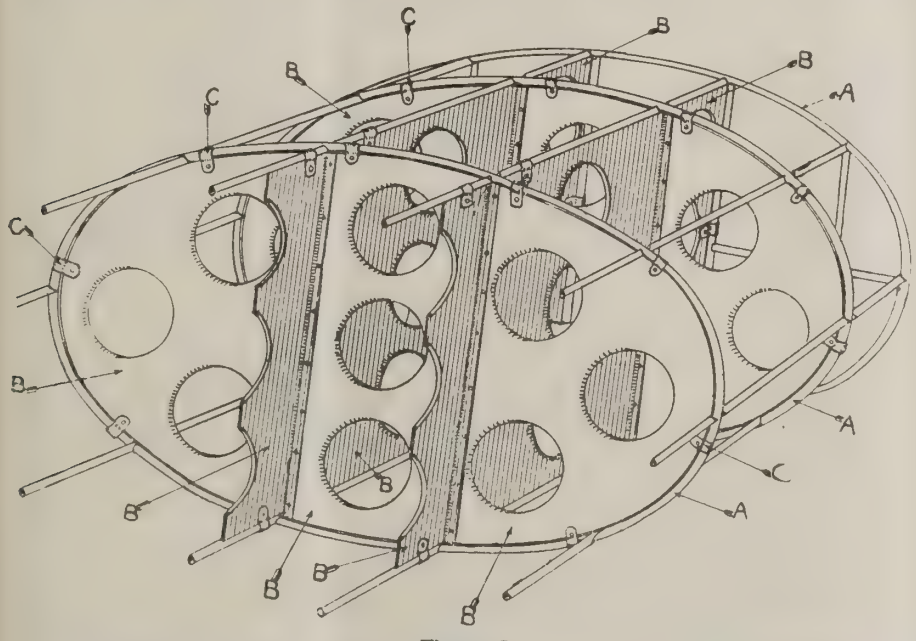


Figure 2

Diagrammatic sketch showing part of the inner framework of an Imber tank for the R. E. 8 aeroplane. One end elliptical framework is not shown in the drawing

Description of the Tank

The Imber tank is composed of three parts. The inside tubular aluminum framework (D-Figure 1) to which sheet aluminum baffle plates (E-Figure 1) are attached. The framework is adapted to fit within and conform to the shape of the shell. The second part of the tank consists of a metal shell (C-Figure 1) into which the baffle plate frame is inserted. The third part of the tank consists of an outside rubber covering (B-Figure 1) which surrounds the entire shell. The resilient or elastic covering returns to its seating against the framework in such a brief space of time that it is impossible for the contents to ignite in the event of the projectile being of an incendiary nature.

The tank is installed in the aeroplane by means of a cradle, in such a way that no rivets, bolts, etc., are used to secure it to the machine.

Framework and Baffles

The general arrangement of the internal cradle or framework and baffle plates is shown in Figure 2. The diagram shows an oval tank, but of course the principle is applicable to tanks of any shape or any size.

The framework is built up of aluminum tubing about 5/16" in diameter and 22 gage in thickness. The diameter and gage of material varies according to the size of the tank. Where the tubes cross one another they are held together by rivets as shown in Figure 3, or they may



Figure 5

A sweated or welded joint on the Imber tank

be welded together. Baffle plates are secured to the framework by means of aluminum clips as shown in Figure 4. In this figure, "e" shows the baffle plate and "f" shows the clip.

The entire framework together with the baffle plates is constructed so that no rivets or other means are used to hold it in place in the shell. It is imperative that the inner cradle be not fixed in any way to the metal shell.

The function of the framework is to form a backing against which the rubber covering may seat itself to form a self sealing covering.

Shell

The shell or casing is made of tinned steel. Other materials including copper were found to be inferior in some respects to the metal finally adopted. Tanks with a capacity of more than 38 gallons are made of number 28 gage tinned steel. Joints are formed as indicated in Figures 1 and 5. The joint is sweated, welded, or otherwise formed without the necessity for the employment of rivets or other members passing through the metal.

Covering

The outer covering is of specially prepared rubber which is put over the entire surface of the tank. The rubber is approximately ¼ of an inch in thickness. Edges of the tank are reinforced with an additional rubber strip ¼ inch thick vulcanized to the covering rubber. The entire tank is then vulcanized for about 75 minutes under a steam pressure of about 40 pounds per square inch.

Specifications require that the rubber covering shall fit closely to the metal shell of the tank but that after vulcanization there shall be no adhesion between the rubber and metal. Adhesion is prevented by chalking the adjacent surfaces of the metal and rubber before the vulcanizing processes.

Rubber is composed as follows:

Best smoked sheet (or other approved rubber)	92%
Magnesium Oxide	2%
Sulphur	6%

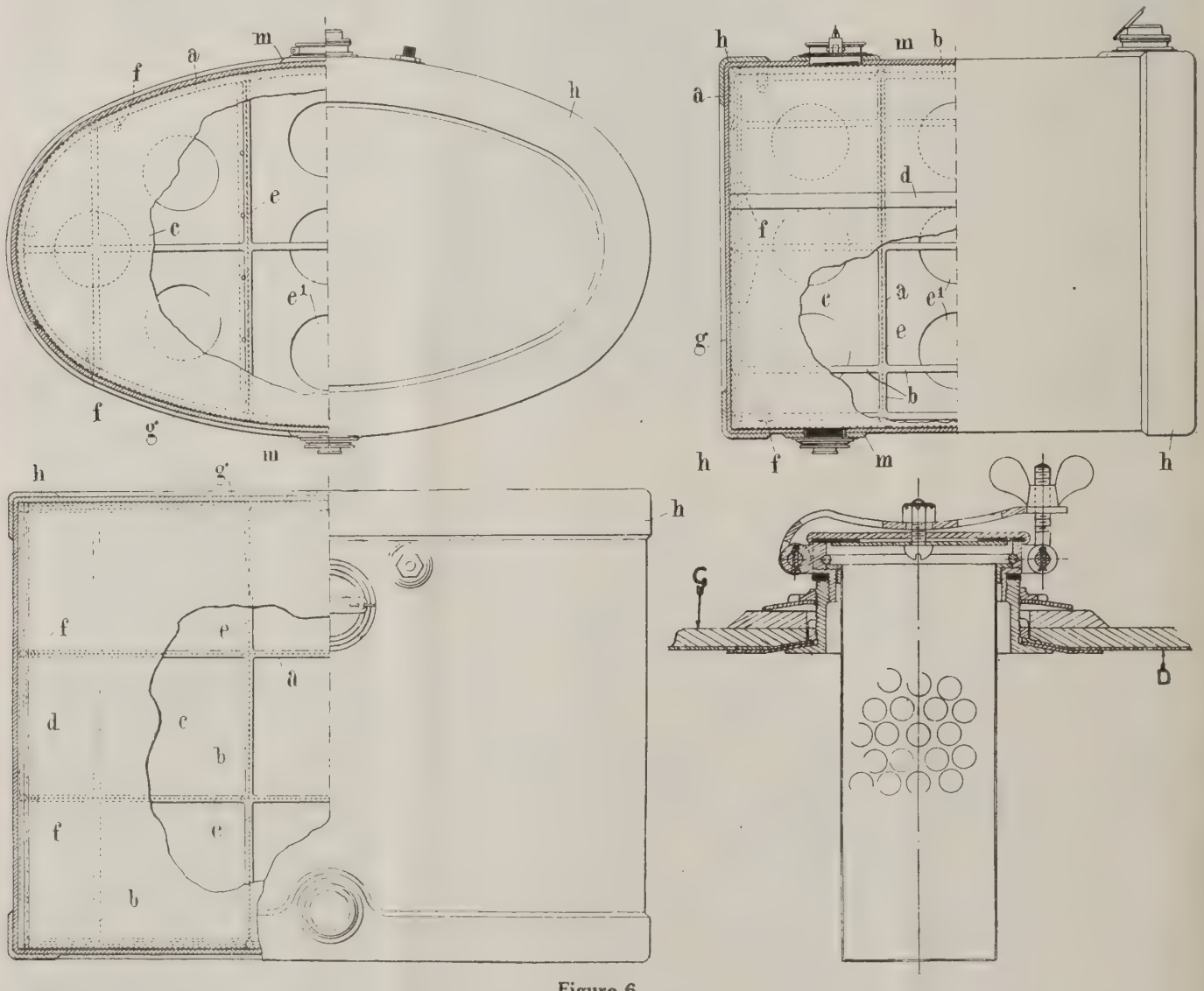


Figure 6

End and side elevations and plan of the Imber tank. Views are shown half in section. *a—Peripheral members conforming to the shape of finished tank;* b—*Members welded to one another to form a complete cradle;* c—*Outer shell or casing;* d—*welded joint (shown in Figure 5);* e—*Internal baffles or partions;* e1—*perforated baffles;* f—*Clip for securing baffles to frame (shown in Figure 4);* g—*Rubber covering;* h—*Rubber reinforcing;* m—*Rubber washer.* The lower right hand detail shows a section through the filler cap.

This is cured to the degree which results in the vulcanized covering satisfying the tests mentioned below. As a trial cure the following is suggested:

30 minutes rising to 40 pounds steam pressure.

65 to 75 minutes at 40 pounds steam pressure.

The quality of smoked sheet or other raw rubber is such that not more than six parts per cent of organic matter and sulphur can be extracted from the finallly vulcanized product after boiling it in a finely ground condition for eight hours with a six per cent solution of alcoholic potash.

The raw rubber compound is calendered into sheets and built up to the required thicknesses by doubling upon a calender. All traces of air are excluded from between various layers.

The vulcanized India rubber is equally and evenly cured throughout and under microscopic examination, is of homogeneous character, free from air holes, porosity and all other imperfections.

Where a sticking solution is used it consists of a solution in coal tar naphtha with the addition of a further four per cent weight of sulphur.

Method of Covering Tanks

In order to prevent blistering during vulcanization provision is made for the dispersal of any air which may be entrapped accidentally between the rubber sheet and the metal tank.

NOTE: A satisfactory method is to affix a series of strings or fabric tapes around the outer surfaces of the metal tank, with the ends of all strings or tapes projecting at the opening in the rubber cover at the fuel filling aperture. Extending not less than one inch beyond each line of the bevel and at least equal to half the thickness of the rubber which it covers.

Where distortion of the tank is found to occur, owing to shrinkage of the rubber curing cure, the compound sheet is shrunk, before building on to the tank, by immersion in

1—Boiling water, or

2—Steam at 1 to 5 pounds pressure.

The treatment should not continue for more than ten minutes.

When the compound sheet is shrunk before building on the tank, all adhering surfaces of seams and joints are roughened and given a sticking coat of the vulcanizing solution before being joined.

The covering is so devised that a minimum number of rubber joints is made.

Where ends are joined by bevel joints the length of the bevel is at least one inch and the joint is strengthened by a super-imposed strap of rubber.

Vulcanization

The rubber covering is vulcanized in position on the tank by steam heat and either the "open-cure" or "wrapped" processes is used. The complete rubber covering is vulcanized in one operation.

When the "wrapped" process is employed great care is taken that the binding is so adjusted as to prevent distortion of the metal tank, and thinning of the rubber cover at points of extra pressure.

During vulcanization the apertures of the tank are left open to permit free entry and circulation of the steam and to equalize the pressure inside and outside the tank.

Upon completion of vulcanization all joints and seams are firm, homogeneous, free from blisters and loose edges and resist stripping by hand.

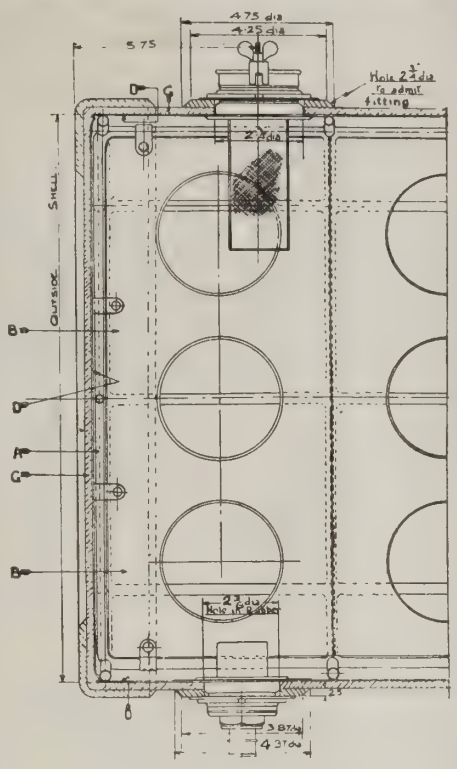


Figure 7

Side section of one half of the Imber tank for the R. E. 8 aeroplane. The cradle comprises four substantially elliptical frameworks, such as A, two of which are braced by horizontal and vertical tubing. The baffle plates (B) are connected to the tubing by clips (C) and to each other by ordinary rivetted joints. The baffling effect obtained is thus identical with that of a standard R. E. 8 main tank while fulfilling the condition that the baffles are nowhere attached to the tank lining (D). G indicates the outer rubber covering

Tests

With each group of tanks vulcanized a test piece is given treatment at the same time. This sample is prepared from the batch of rubber compound sheet which is used to cover the tanks.

1. Where an "open cure" is employed the piece of compound sheet is 0.25 inches thick and at least 8 inches square.

2. Where the "wrapped" process is used, the compound is made up on a mandril in the form of a tube having a wall thickness of 0.25", a length of 8 inches and an internal diameter of at least 2⅝", wrapped before vulcanization in the same way as the tank.

The sample is vulcanized in the same way and at the same time as the India rubber covering upon the tank and it is marked with an identification number corresponding with that upon the tank which it represents.

1. For chemical tests the combined Sulphur by difference of the sample should be between 3% and 4.5%.

2. A piece of sheet of 0.25" x 0.5 x 1" immersed in gasoline at a temperature of 15.5°C., for a period of five minutes should increase in volume within a minimum of 8% and a maximum of 12%.

For physical tests a rectangular piece of vulcanized sheet 0.25" thick and 0.5" wide is stretched to three times its original length for 24 hours and it should regain within six hours after release its original length within plus 2.75 per cent.

Final Test

After vulcanization and completion of the covering, an internal pressure of one pound per square inch is applied to the finished tank; at the end of a period of 15 minutes there should be no indication of leakage as measured by loss of pressure.

Fittings

In order to provide for the greater security of the tank against leakage, all fittings are provided with double seatings so that in the event of one joint giving away there will still be a second joint to prevent leakage.

In one convenient form of fitting the desired effect is obtained by having a flange internally threaded bush sweated upon the inside of the casing and surrounding the aperature for the fitting. Into this is screwed a second bush or sleeve carrying the fitting which makes with the first mentioned member a joint by means of fibre or packing. This second bush or sleeve projects beyond the rubber covering of the tank and is surrounded by a metal washer which is forced into close contact with the exterior of such covering by means of a flange upon such sleeve so as to form a second joint or seating for the fitting. The inner bush is so constructed and arranged that it is practically flush with the inner surface of the metal shell.

No part of the fitting is allowed to project into the tank in a manner which would prevent the cradle from being slipped into the tank.

A specially designed filler cap is provided, as shown in one of the diagrams of Figure 6. The cap is held securely in place by means of a single wing nut and flat spring. The arrangement has been found to be very simple in operation for there are no parts to become detached and it is easily manipulated by inexperienced mechanics, without danger of damaging the tank.

The diagram shows the outer flange or collar in position before being screwed down. By screwing down the collar the outer edges of the washer press into the rubber reinforcing strip, making the joint tight and leak proof. In the diagram, G shows the rubber covering, and E, the metal shell.

Retention of Fuel in a Crash

Besides eliminating leakages due to bullet holes, the Imber tank is able to retain its liquid when subjected to a severe blow from the exterior. Minor shocks are, of course, taken care of by the rubber covering, but when a hard blow is struck the internal construction gives. While the framework is strong enough to give adequate bracing to the tank under ordinary usages, it is purposely made collapsible upon the application of a blow likely to cause a puncture. In the case of a landing in which a smash occurs, the rubber covering retains the gasoline no matter how badly the tank may have been battered. While the framework of an aircraft may crumple and strike forcefully against the tank or the tank strike the ground, the result will merely be a distortion of the shape of the tank, thereby minimizing the danger of fire from the inflammable liquid that otherwise would have been sprayed about the wreckage.

A feature making the use of the Imber tank unlimited in its application is the fact that it can be made of any shape or size and not only is it suitable for use on aeroplanes and dirigibles, but it is also of great value for storage purposes on the ground.

THE ZEITLIN AERO ENGINE

WE have just secured the details concerning the design and construction of an interesting new aero engine, the invention of Mr. Joseph Zeitlin, of London, England. The engraving, Fig. 1, represents Mr. Zeitlin's first engine. The general arrangement, given in Fig. 2, illustrates the design of a nine-cylinder engine on the same general lines as the first seven-cylinder example, but embodying certain minor, though important modifications, introduced as a result of experience with the preliminary engine.

The new engine resembles certain other aero engines in so far as it is of the four-stroke cycle, rotary type. Its fundamental point of difference consists in this, that the piston stroke is not of uniform length in each of the four movements constituting a complete cycle. What happens in the case of an engine having a working stroke of 181 mm. can best be explained by means of the simple diagram given in Fig. 3. After the downward working stroke of 181 mm., the piston executes an upward exhaust stroke of 203.5 mm. The extra 22.5 mm. of movement brings the top of the piston almost up against the face of the cylinder head, and very thoroughly clears out the products of combustion from the cylinder. The exhaust takes place through a mechanically operated valve situated at the center of the cylinder head. The succeeding downward suction stroke is 226 mm. in length. The extra 22.5 mm. of motion in this stroke results in the piston overshooting a port B in the cylinder wall near its foot, and, as a result, explosive mixture passes from the crank case into the cylinder interior. During the suction stroke the exhaust valve is held open for some distance A, so that a suitable proportion of air for the combustion of the explosive mixture may be drawn into the cylinder. The succeeding compression stroke of 203.5 mm. stops about 23 mm. or so from the cylinder head, so as to afford a proper amount of compression space, and leave the piston in the correct position to commence the working stroke. The working stroke, it will be gathered, stops short just before the inlet port B would be uncovered.

It will be seen then that the piston, in addition to its ordinary reciprocation through 181 mm., performs a harmonic motion through a range of 22.5 mm. This result is achieved by coupling the connecting rod not straight on to the crank pin, but on to an eccentric bush of 15.907 mm. throw surrounding the crank pin, and by driving this bush round the crank pin as axis, in the same direction as the engine and at one-half the engine speed. The crank throw is 101.75 mm.

To understand how this arrangement gives the required motion to the piston, the diagrams given in Fig. 4 will be found of assistance. For simplicity we have here represented the idea applied to an ordinary fixed-cylinder, rotating-crank shaft engine. At the commencement of the working stroke, the crank is at O A and the center of the eccentric at B, the angle O A B being 45 deg. Were the eccentric fixed rigidly to the crank pin then at the end of the working stroke its center would be on the line C D. As it is, during the half revolution of the crank, the eccentric is driven round the crank pin through one-quarter of a revolution in the direction of the arrow marked on it, so that at the end of the working stroke the center of the eccentric is at E. The effective length of the working stroke is thus not A C but B E, or two cranks minus twice the horizontal projection of the eccentricity A B or, in symbols, $2r - 2p$. During the exhaust stroke the eccentric makes a further quarter revolution so that the effective length of the exhaust stroke is F G, or $2r - p + p = 2r$. Similarly, the effective length of the suction stroke is H J or $2r + 2p$, and of the compression stroke K L or $2r + p - p = 2gr$. The throw A B of the excentric being 15.907 mm., and the angle O A B 45 deg., the horizontal projection p measures 11.25 mm. The crank radius being 101.75 mm., the lengths of the strokes are as follows: Working stroke, 203.5 — 22.5 = 181 mm.; exhaust stroke, 203.5 mm.; suction stroke, 203.5 + 22.5 = 226 mm.; compression stroke, 203.5 mm.

In Fig. 4 it is to be noted we have shown the eccentric as rotating in the *opposite* direction to the crank shaft. So far as the mere motion of the piston is concerned an exactly similar result is obtained by rotating eccentric and crank shaft in the *same* direction, as will be made clear by a study of Fig. 5. Let us consider the difference between these two arrangements as applied in a rotary engine of Mr. Zeitlin's actual type. In Figs. 6 and 7 we illustrate diagrammatically what occurs between the eccentric and the connecting-rod big end during the working or explosion stroke when respectively the eccentric is made to rotate oppositely to and in the same direction as the cylinders. In Fig. 6, A is supposed to be the crank, B the eccentric, and C the connecting-rod. When the piston is at its inner dead center let us mark the eccentric at D and the connecting-rod bush at E. Imagine for the moment that the eccentric is fixed rigidly to the crank pin, and that the engine is turned through half a revolution. The point D remains stationary at F, but the point E moves round to G through the arc F H G. The design of the engine, however, requires that the eccentric when the piston is at its outer dead centre should be in the position shown in the third sketch. In other words, the eccentric has to be rotated on the crank pin, so that the point D may move from J to K. This is achieved by turning the eccentric clockwise through a right angle. The total relative movement between the eccentric and the connecting-rod bush is thus the arc K J L.

In the alternative arrangement illustrated in Fig. 7, the motion of the point E is as before through the arc F H G. But this time the motion of the point D is anti-clockwise from J to K. Thus the net relative motion of the two points is through the small arc K M L. It will be seen then that the rubbing speed in the first case is three times as great as in the second. The rate of wear is correspondingly greater. In his first experimental engine Mr. Zeitlin adopted opposed rotations, but the important practical consideration we have just explained has led him in his subsequent designs to abandon it in preference for rotations in the same direction.

In the earlier arrangement the bush A, Fig. 8, surrounding the crank pin and carrying the eccentrics was rotated by a

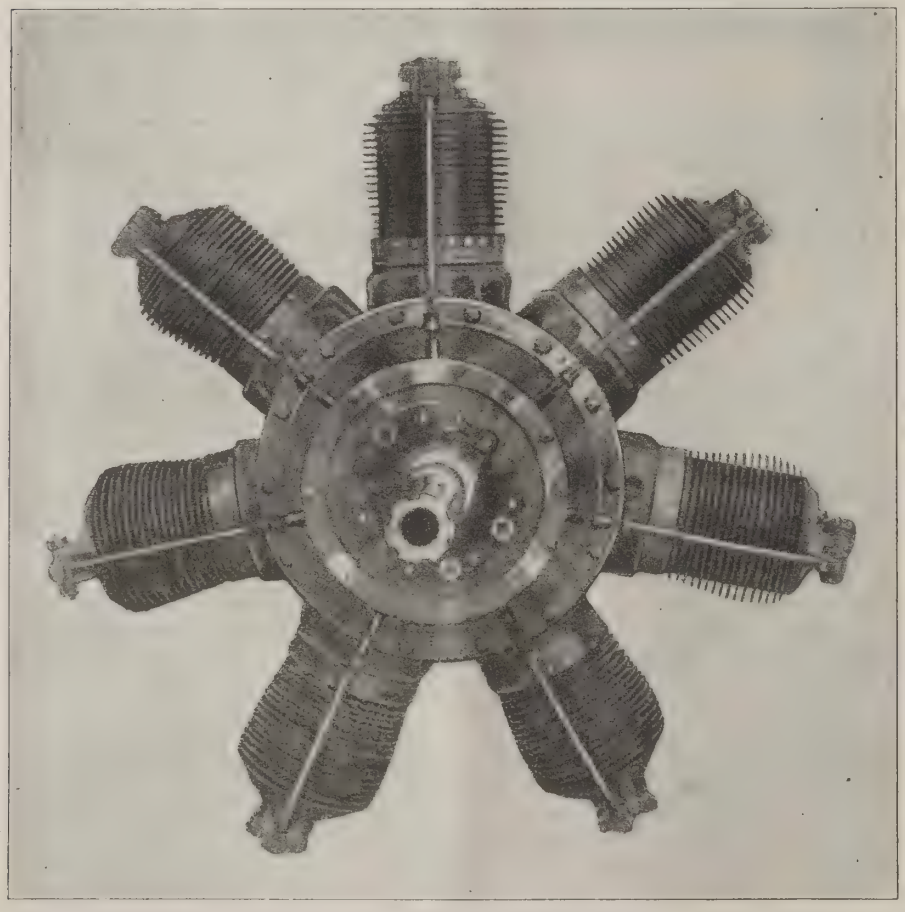


Figure 1
The Zeitlin Aero Engine

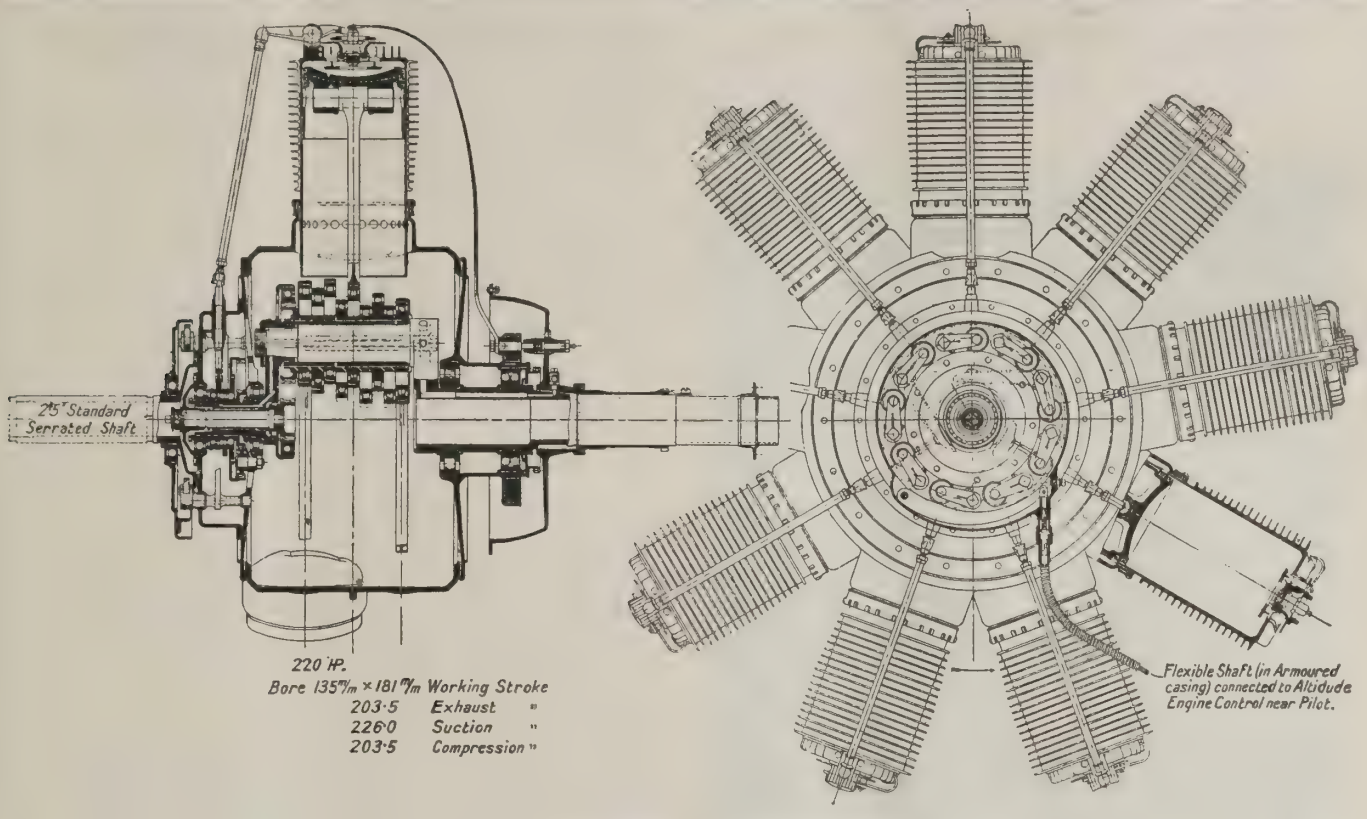


Fig. 2—NINE-CYLINDER 220 HORSE-POWER ENGINE

pair of gear wheels B C, the first fixed to the bush, and the second journalled on the crank shaft, but fixed to and rotating with the crank case. In the later arrangement the obvious method of driving the bush D is to employ two wheels E F connected by an idler G to give the required reversal of direction of rotation. It was found difficult, however, to get a three-wheeled 2-to-1 reduction train into the space available, and for this and other reasons Mr. Zeitlin evolved the patented system shown diagrammatically in Fig. 9. In this system two wheels A B of a 2-to-1 ratio are arranged inside an internally geared ring C. The wheel B is united to the crank pin sleeve D which carries the eccentrics. The spindle of the wheel A is fixed to the rotating crank case E in line with the extension piece F carrying the propeller hub. The ring C is mounted on balls within a flanged disc G. This disc forms one web of the crank. It is bolted to the crank pin and at H provides one of the journals whereon the crank case rotates. The journal H is bored to receive the spindle of the wheel A. It will be seen that the sleeve D is thus driven in the same direction as the crank case rotates in, and that, in fact, the ring C is exactly equivalent to the idler pinion shown in Fig. 8.

There is another substantial advantage, besides that of reduced wear, involved in driving the eccentrics and the cylinders in the same rather than in opposite directions. This advantage is concerned with the nature of the stresses thrown upon the teeth of the gearing driving the eccentric bush. Without going into an elaborate demonstration, we can only say that with the earlier arrangement the bending stress on the teeth of the wheel is reversed once every half revolution, the average reverse stress being practically equal to the average direct stress. With the later arrangement this serious practical disadvantage is avoided.

Turning now to the general drawing, it will be understood that the side-by-side disposition of the nine eccentrics on the crank pin requires the nine cylinders to be correspondingly staggered round the crank case. It seems hardly possible to combine the Zeitlin eccentric crank arrangement with the co-planar cylinder disposition found in the master connecting-rod and other types of rotary aero motors. Nevertheless, Mr. Zeitlin has succeeded in placing the cylinders in such a way that lack of balance arising from their being staggered has been eliminated. Starting with the left-hand eccentric as No. 1, the eccentrics are associated with the cylinders in the following order:—

Eccentric, No. 1 2 3 4 5 6 7 8 9
Cylinder, No. 1 8 3 6 5 4 7 2 9

The order of firing in the cylinders follows the sequence usual in rotary aero engines, namely, 1, 3, 5, 7, 9, 2, 4, 6, 8.

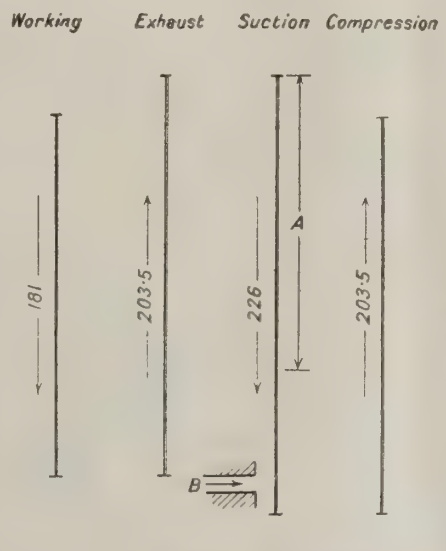


Fig. 3—LENGTHS OF STROKES

The form of the central exhaust valve should be noted. It is in the nature of a ring which closes and opens an annular port in the cylinder head. The sparking plug is disposed at the center of the ring, the idea being that the exhaust passing into the annular port round the inner and outer circumferences of the valve shall not cause any deposit in the neighborhood of the sparking plug. In our presence one of the cylinders of the first engine was removed after a run. It was found that whilst the cylinder head beyond the larger radius of the exhaust valve was coated with oil, the surface within the ring was clean.

The electrical connection between the sparking plug and the distributing ring is a flat strip of stream-lined duralumin formed with an eye at one end to clip on to a button at the top of the sparking plug. The other end of this lead is fixed to the distributing ring by means of a stud and spring washer, constituting a self-tightening connection. The object of these details is to permit the ready removal of the cylinder in the least possible time. To effect this removal, the duralumin lead is first pressed slightly towards the cylinder until its eye is released from the plug button. It is then pushed backward—into the plane of the paper, as it were, in the general arrangement drawing—so as to clear the cylinder. It now remains only to free the large nut that holds the cylinder within the screwed gland in the crank case. With this nut released, the whole cylinder can be lifted away, for, as usual, the valve rod and tappet rod are not mechanically connected. It will be noticed that the cylinder body is made in two parts, the inner part, the cylinder proper, being a separate entity from the outer part, carrying the radiating fins. The latter part is made in aluminium.

The method of operating the exhaust valves, and the altitude control associated with it, is one of the most interesting

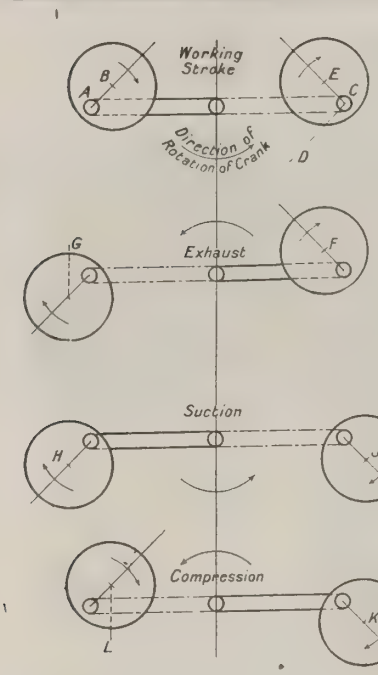


Fig. 4

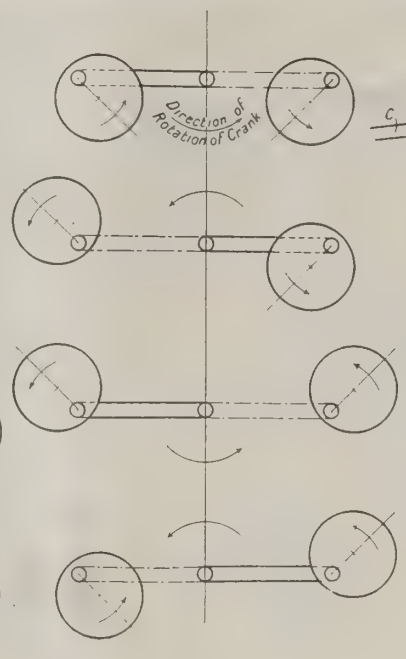


Fig. 5

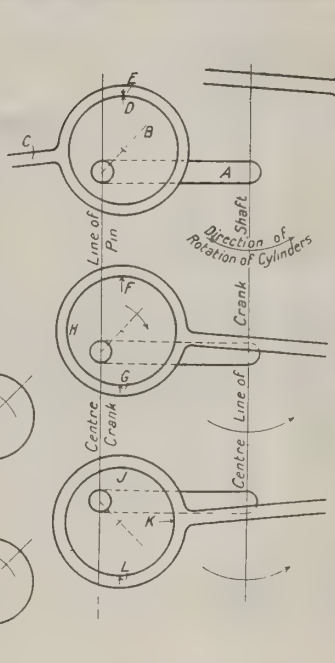


Fig. 6

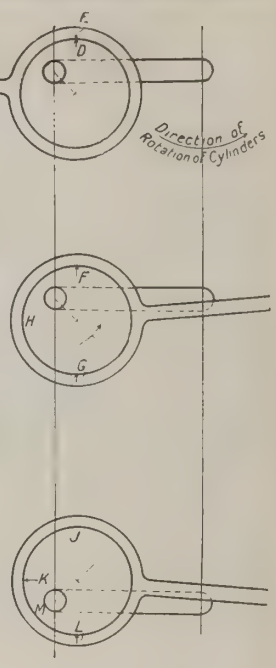


Fig. 7

features of the engine. Fig. 10 indicates in diagram form the essential ideas involved. The nine exhaust valves are operated by three cams A, B, C, formed on a sleeve which is extended to provide an internally geared wheel D. The cam member rotates on the sleeve of a gear

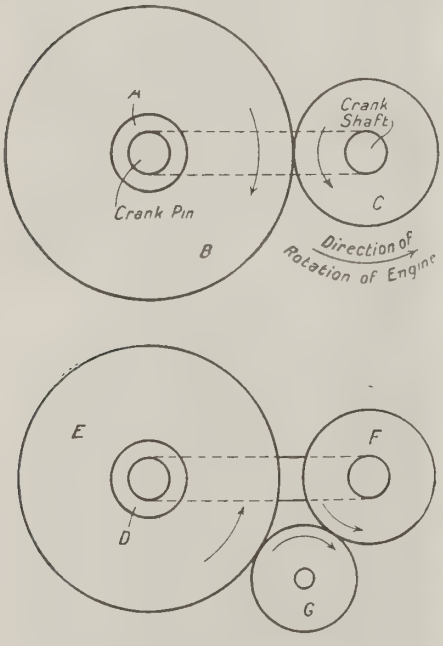
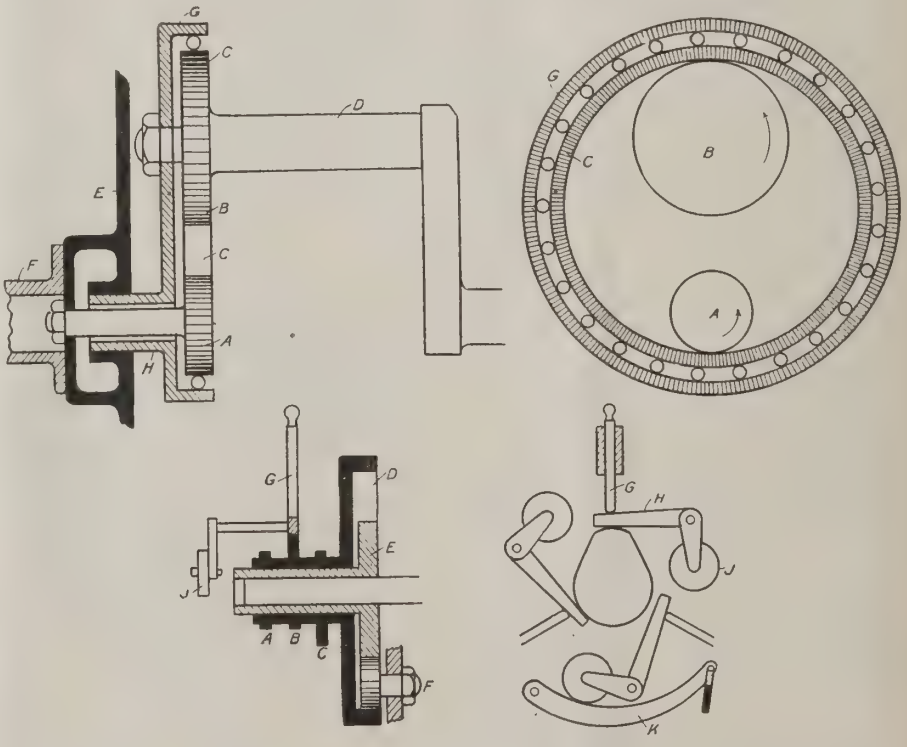


Fig. 8

wheel E fixed on the end of the crank shaft, and meshing with the internal gear wheel D through an idler pinion F pinned on the crank case. The cam member is thus driven at half the engine speed in the same direction as that in which the cylinders rotate.

Associated with this drive of the cam member there is an altitude controlling arrangement. In an ordinary aero engine the power developed falls off as the height of the aeroplane increases, because (1) the percentage of oxygen in a given weight of air decreases as the altitude increases, and because (2) the weight of air drawn into the cylinder decreases, for although the induction volume remains constant the density of the air falls off with the altitude. In Mr. Zeitlin's engine the distance A—Fig. 3—is such that the weight of air drawn into the cylinder at 12,000 ft. altitude, together with that obtained from the crank case with the mixture, is sufficient to permit the engine to develop its full rated power at that altitude. It naturally follows that at lesser altitudes the weight of air drawn in past the exhaust valve during the suction stroke is in excess of actual requirements. To obviate the engine thus running at low altitudes with mixtures that are too weak, Mr. Zeitlin arranges to open the exhaust valve again during a portion of the compression stroke, so that the excess air may be expelled from the cylinder before it has time to mix thoroughly with the explosive vapor. The length of time during which the exhaust valve is held open on the compression stroke can be regulated to suit the altitude. In this way, if the regulation is properly attended to, the engine can be made to give the same power at all altitudes from the ground up to 12,000 feet. The mechanical means whereby the exhaust valve is held open during a variable portion of the compression stroke are indicated in the sketch, Fig. 10. The tappet G, it will be seen, does not bear directly on the cam surface, but has interposed between

(*Continued on page* 1027)



Figs. 9 and 10

PRELIMINARY NAVAL FLIGHT INSTRUCTION

By NICHOLAS S. SCHLOEDER

CONSIDERING the general information available on the art of flying, it is astonishing to find so large a number of students who approach this active work with more or less inaccurate and false preconceived notions of the subject. This is due partly to the many absurd notions of flying entertained by the layman, reflected in newspaper accounts of accidents, where one reads that "he was descending in spiral, when his engine stopped, and he crashed to earth," or that "he was seen to pull his elevator all the way back, yet could not clear the obstruction, crashing, etc." However, as students have already undertaken a theoretical survey of the subject, they know better than this; yet, unless care is taken, beginners often derive many confused ideas.

The reason for this is due to a condition not alone peculiar to aeronautics. On one hand, we have theoretical workers, designers and mathematicians, few of whom are actual fliers. On the other hand we have practical fliers, a majority of whom are deficient in scientific training and habit of thought. Thus, they sometimes fail to convey their acquired knowledge succinctly enough, and their loose generalities often seem to contradict previous study, with resultant confusion.

Another type of preconceived notion is in the psychological aspect of flying. Many students approach actual flying with much misgiving and doubt as to their ability to learn. Dispell it at once. There is no such creature as the "birdman" or the "flying type," about whom once much was heard. While fliers differ in skill and, more often, in daring, any normal person can learn to fly well. Those who can't are very rare indeed. Physical deficiencies and nervousness are not necessarily deterrents. Since the days of Herbert Latham and Chas. K. Hamilton, down to the late Guynemer, even consumptives have become skilled pilots. Hence, students should not take flying too seriously. It is as easy and safe as automobiling, if a few simple rules are not disregarded. Bear in mind, no one ever "gets" into a tailspin, side-slip, etc. Through failure to understand or appreciate some fundamental principle, he might "put" himself into one, but it isn't accidental.

Another psychological aspect is a fear entertained by some students of their instructor. This should be banished at once. Instructors are wont to correct mistakes rather vigorously at times, but this should not be misconstrued. Students have enough to think about flight without worrying about their instructor. They should at all times feel free to ask questions about any difficulties which might occur to them. For this reason I have always considered the relation of instructor and student as the one place where a limited amount of comity is permissible.

The First Flight

Though it has been an accepted practice to confine the initial hop to a joyride, it is best to let the student do as much as is reasonably safe after a few minutes in the air. In this way, students maintain balance and execute turns almost before they realized themselves in flight. They are thus spared of much time and trouble, for I recall in the gradual system under which I was taught, each new function—the rudder, flippers, turns, glide, etc., was a prolific source of concern to me as they occurred, and materially added to the length of instruction. I found a large percentage of students able to maintain themselves reasonably well from the very outset. With a sufficiently clear system of signals, there is no danger of the student "freezing" on the controls.

Signals

For the student to take control, I signal by holding up my right hand with thumb pointed backward to pupil and shake it several times. Now if he climbs too much, I hold up both hands, fingers extended forward, palms down, and by waving fingers signify that pupil should gently push his controls forward to depress the nose of machine. If the nose falls too low, I reverse the position of palms, turning them upward and back, and wave fingers to denote that student must gently draw controls to himself. Upon assuming proper climbing angle, I close hands, indicating that the position should be held. If either wing drops, I point hand on offending side extending outward, palms upward, motioning with fingers to lift wing by raising wheel on that side. (Now, when right wing drops, and right hand raises wheel, the top of wheel moves to left; in stick control the stick is moved over to left; hence, this movement is often called "left aileron;" but this term confuses the student and should be avoided.) When more right rudder is desired; that is, when



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student should move rudder bar forward with right foot, I hold up right hand and move it forward several times; similarly, left hand for left rudder. I indicate turn by extending arm and sweeping it to right or left, as the case may be. For a glide, I hold up both hands and motion down, fingers extended to indicate proper glide. If the student overcontrols on any of these signals, I repeat the signal and follow by holding up two fingers, denoting "too much." In taking controls from student, I touch my helmet with index finger and shake controls; this is the signal for him to let go of controls *at once,* and put both hands on cowl in plain sight; if I do not find them there upon turning around, the student will be severely reprimanded. In this way I have effectually prevented "freezing" on controls.

Controlling

The average student passes through successive stages in his manner of controlling. The first tendency is to undercontrol; next overcontrol, and finally he controls in the responsive, quick and gentle manner which characterizes the experienced flier. He usually passes from the first stage after a few hours, but in most cases he does not entirely enter the finished stage until many hours of solo flight are passed.

To guide the student to overcome undercontrolling, it might be stated that the order in which the controls may be used with most freedom without endangering stability are: ailerons, rudder and elevators.

The chief reason for the initial period of under control arises from the sensation of novelty which the beginner experiences, which places him under a certain tension. This causes him to grip the controls too tightly and hence his movements are stiff. A student must learn to relax himself without delay—as indeed, many accomplish—and should strive to make his movements light and flexible. He need not be afraid to operate the controls, for he can always correct himself if he has made a mistake.

Soon he begins to overcontrol. At first this is the natural outcome of his initial fault. Later, particularly in his early solo hours, it is due to a tendency to exaggerate the significance of "bumps," etc., which experience in time will overcome. This is easy to understand.

However, it is not so readily appreciated how stiffness in control will lead to overcontrol, so I will give an illustration. Let me assume that a wing is suddenly depressed in flight. A beginner, either because of tension or a still undeveloped "air sense," will be slow to notice this, and makes no move.

Suddenly he recovers himself, and signifies this by imparting a ponderous heave to the wheel. The wing now comes up, but the beginner, with death grip still fastened on the wheel, forgets to neutralize his controls now that their work has been done. So the wing continues upward, depressing the other wing, which soon receives corresponding treatment. Thus he flounders about from side to side, heaving and yanking. An experienced flier, on the other hand, meets the same situation like this. He responds at once, as he feels the wing going down, so that he corrects while, and not after, the air current is tending to depress the wing, so that in most cases he effectively prevents this condition at the start. The air current being past, he at once neutralizes his controls. This difference between crude and experienced fliers may be summed up in a general statement which every student should memorize: A beginner is ponderous, jerky and slow in his use of controls; an expert is responsive, quick and gentle. A beginner's controls appear to move but seldom, but through large distances; they should appear to move more often, but only slightly.

A Straight Course

Longitudinal stability is the first consideration in flight. To ascertain the proper flying angle, it was formerly the practice to define a position on a given machine, such as a part of the rocker arms of engine, which the pilot was to "line up" with the horizon. This made him depend too much on a mechanical device, which, as in clouds, is sometimes wholly unavailable. A student should learn to guide himself by feeling. Apart from sense of balance, the action of engine serves as a gauge. Thus, if the climbing angle is too high, the engine will labor, causing some vibration, while the R. P. M. will fall. Likewise, as the angle increases, the tail surfaces will appear to lose their functions, due to decreased speed and therefore decreased pressure. On the other hand, the engine will race where the climbing angle is too low. Having attained the proper angle, the pilot should endeavor to hold it as steadily as possible, to do which he must be flexible and gentle. In rough weather it is only necessary at times to depress the nose gently and slightly to obtain greater speed; the controls should never be jerked forward and back on encountering a "bump." Learn to "ride" adverse currents, never "fight" them with your elevators.

The relation of engine speed to climbing angle must not be confused with its relation to engine power. In this connection it is important to bear in mind that the proper climbing angle is directly proportional to the power generated by the engine. Thus, when an engine is failing, the angle of climb must be reduced at once. Gravity must be called upon to make up for deficiency in motive power to prevent loss of speed. Induced "nosing her down" is the panacea for nearly all ills of an aeroplane. Hence, a student must always be ready to alight, keep a suitable landing place within gliding distance, and keep ever in mind the direction of the wind.

Wind direction is indicated by streaks in the water running parallel to it, which on calm days are often hard to find or almost entirely absent. The waves furnish a less significant indication, as they are often the result of currents. However, they usually run in parallel lines which are crosswise to the wind. Neither of these signs indicate anything more than the line along which the wind is blowing. The correct alternative may be learned by watching smoke, etc., or better, by observing the general direction on leaving the beach and keeping this in mind.

In the maintenance of lateral stability, the function of ailerons considered alone, presents no special difficulty. The student need only act promptly; less movement will then be necessary.

However, the operation of ailerons in conjunction with rudder is perhaps the most important relation in the art of flying. Some confusing and apparent contradictions are presented.

When ailerons are used to raise a wing, and no change in direction of machine is permitted, the rudder must be increased on the side which is lifted. Thus, if a pilot flies with the right wing dragging, and he raises it with his ailerons, the machine will swerve to the left if he does not increase his right rudder, because of torque. (A dragging wing results in a slight side-slip, and has much the same effect as rudder in overcoming the tendency to the left, as this slip, acting on the vertical tail surfaces, swings the tail to the opposite or high side. Hence some aviators take advantage of this in piloting large H-S boats, where the strain on the right leg is great, by dragging their right wing, thereby relieving the pressure.) In other words, a student who consistently flies with right wing low, does not hold enough right rudder; and similarly, too much right rudder if left wing is down.

Yet the use of opposite rudder in raising a wing, particularly those possessing marked dihedrals, is one of the most elementary and universal in the art of flying. The explanation of this seeming contradiction is this: Where opposite rudder is used, a momentary change of direction occurs. As is evident, the wing on the outer side of the turn will have greater speed and therefore lift, thus bringing it up. To prevent a permanent change of direction the rudder must then be brought back. The temporary character of this rudder function cannot be too strongly impressed on the student.

A further reason for use of opposite rudder results from the slight drag of a lifting aileron, tending to swerve the machine to the side lifted. This again is only temporary, while the aileron is depressed. It is likewise less important than many students have been, incorrectly, advised.

Rudder action for lateral stability, in résumé, really consists of two movements, i. e., first, opposite rudder to increase lift of outer and lower wing and to overcome slight drag, followed by rudder on same side to prevent permanent change of direction; and also, in conformity with the principle that a lifted right wing demands more compensation for torque, and vice versa. Hence, the great importance of flexibility in rudder action, the absence of which being so largely responsible for the yawing of beginners.

Little further need be said about the use of rudder in straight flying. It is well to call to the attention of students that the pressure on the right rudder bar, due to compensation of torque, is sometimes considerable; many are often led to believe that the instructor is executing this pressure, which of course, is not the case. The student must be impressed with the necessity of holding the rudder, for large numbers permit the machine to swerve to the left because of failure to do so. On the other hand, some hold this rudder too steadily, thereby losing the flexibility of rudder action which is so important.

(*To be continued*)



Four types of flying boats and seaplanes used for naval aviation instruction taking off in formation

A RELIABLE TAUTOMETER FOR TESTING DOPED SURFACES*

By T. W. H. WARD, Managing Director, Titanine, Ltd.

AS is well known, aeroplane dope has the peculiar property, when applied to fabric, of pulling it taut. Bearing on this property several new words, such as "tauten," tautness," and "tautometer," not appearing, I believe, in any standard dictionary, have had to be coined, but they have the advantage of being readily understandable.

The power of tautening varies with different dopes, hence the necessity for the tautometer, which should measure the degree of tautness brought about by the particular dope or covering employed. Until recently the "tautness" was simply more or less guessed, the method usually adopted being merely to tap the doped fabric and to deduce the tautness from the note produced. The higher the note the greater the "tautening" power of the dope was assumed to be.

The function of a tautometer is to measure the effect of a depressing force, usually exerted by applying a known weight to the center of a known area of doped fabric.

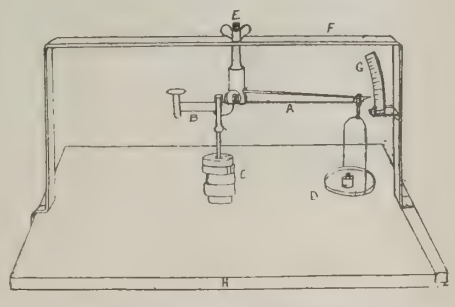
This tautness determination is a measurement of at least two important factors of the dope, i.e., the tension or state of strain given to the doped fabric and the flexibility of the dope film.

The method of tapping has proved to be both inaccurate and misleading. For instance, a hard film is frequently obtained when an acetyl dope is employed and the doped fabric sounds tauter than measurement with a reliable tautometer proves it to be. In reality a high note frequently indicates a hard and brittle film which will have a great tendency to crack on exposure.

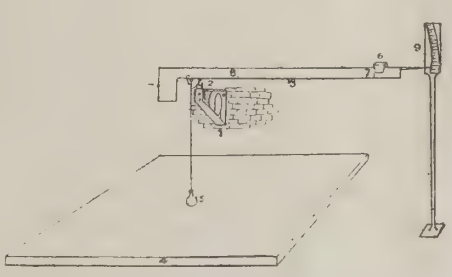
There are various types of instruments for example, consists of a heavy round- for measuring "tautness" now in use; one, bottomed framework, having a pivot through the center attached to a spring on the upper side, which, in turn, is connected with a pointer. Except for a knob fixed to the lower end of the pivot only the outer rim of the round bottom of the instrument touches the doped fabric. This instrument is placed on the frame to be measured, and according to the "tautness" of the doped fabric the knob at the end of the pivot is pushed upwards to a greater or less extent, thus compressing the spring and moving the pointer round to a position which may be read off on a circular scale. This instrument has many disadvantages, the chief of which is that only the tautness of the small portion of the doped fabric enclosed by the rim of the instrument is measured. Also, the whole weight of the tautometer on the doped fabric, and that is obviously no small factor in its disfavor. One cannot consider this instrument at all satisfactory, and yet it has been the one most commonly used for the purpose.

Unlike other instruments used for measuring tautness, the tautometer used by my firm is based on the principle of a balance with a 10 to 1 beam (or any other convenient ratio), so that the deflection of the long arm (Fig. A) may be magnified for a slight depression of the other (B).

This beam is suspended on a knife edge in the ordinary way, except that the support is connected with a screw (E) which is used to adjust the beam to any height required. This screw also serves



The tautometer designed by Mr. Ward based on the principle of balance



The usual type of tautometer used for measuring degree of tautness with various qualities of dope

to fix the whole apparatus to a framework (F)—which fits over the frame to be measured in such a way that the specified weight (400 grammes having been adopted in the case of the instrument described) is suspended from the short arm, exactly over the center of the frame. This weight is compensated by a 40-gramme weight (D) in the scale pan, suspended from the long arm (A).

When this tautometer is placed on a frame the reading of the pointer, at the end of the long arm, should be at zero on the curved scale (G) attached to the framework at the right hand side. If this is not the case the necessary adjustment may be effected by turning the screw (E) in the direction required either to raise or lower the beam. When this has been done the 40-gramme weight should be removed from the scale pan. This causes the 400-gramme weight (C), which till now has been just touching the surface, to rest on the doped fabric and the depression due to it may be read off by means of the pointer and scale at the other side. This curved scale may conveniently be divided into divisions representing millimeter (or fraction of an inch) depressions of the 400-gramme weight on the doped fabric.

The 10 to 1 beam has the advantage here of causing quite a perceptible deflection of the pointer for only 1 m.m. depression of the weight, and it must be understood that the smallest deflections are caused by the tautest frames.

The instrument has been in daily use by my firm for two years, with extremely satisfactory results. A simple adaptation on the same principle has also been used for much larger frames (and might with advantage be employed for aeroplane wings), as follows:—

In this case all framework is dispensed with, except for the bracket (1) used for supporting the knife edge (2) of the beam (3). This is fixed to the wall at a convenient height and should stand out half way across the frame (4) (or wing to be measured), so that the weight (5) to be used for determining the tautness may be arranged to touch the center of the frame. The beam, itself, should be counterpoised, as before, so as to give a long arm and a short one, when in equilibrium on the knife edge. Then, as in the previous case, a heavy load is suspended from the short arm to test the tautness of the doped fabric, but, unlike the other tautometer, instead of having the compensating weight in a scale pan, a sliding weight (6) has been adopted, which is placed directly on the beam. When a reading is taken, one slides the weight from the marked position (7) of equilibrium to another position (8) nearer the knife edge, so calculated as to allow the necessary load to rest on the doped fabric. The reading of the pointer on the curved scale (9) may then be read off as before, to show the depresion of the doped fabric caused by the weight of the load.

The great advantage of the principle, described above, is its simplicity, the readings obtained being the direct result of allowing a specific weight to rest on the center of the doped fabric. This is a great improvement compared with other instruments, which, by having their whole weight resting on the surface, both complicate matters and give misleading results.

* Courtesy of *The Aeroplane*, (London).

Book Review

PRACTICAL FLYING, *by Flight Commander W. G. McMinnies, R. N.* This is the first practical work on actual flying and instruction for the flying services, covering the whole field, from elementary groundwork to advanced flying. It is profusely illustrated with diagrams and detailed drawings; also a complete glossary of flying terms and phrases. It is a volume that has been and is extensively used, and highly recommended by instructors of flying, men who have had much experience along this line. Price $1.65, post paid.

AIR SCREWS, *by M. A. S. Riach.* The author deals with the subject of propellers in a most complete and comprehensive manner. This is a more technical treatise on the subject. The theory in this present volume has been assumed to be absolutely correct and results obtained have been carried to their logical conclusions. It treats of pressure on aerofoils, pitch of an air-screw, the forces acting on an air-screw blade, blade shape and efficiency, blade sections and working formulae, "laying out" the air-screw, stresses in air-screw blades, static thrust, efficiency of an air-screw at different speeds of translation and direct lifting systems, also contains a note on the influence of "aspect ratio" and the effect of the indraught in front of an air-screw. Price $5.75, post paid.

AERIAL PROPELLER, *prepared by Charles B. Hayward.* Design theory of action, thrust, pitch ratio, and construction of the two-blade propeller are the subjects treated of in this instrucive paper. Price 60c, post paid.

TERMES D'AVIATION, GLOSSARY OF AVIATION TERMS ON FRENCH AND ENGLISH. The title alone explains the contents of this valuable publication. Price $1.10, post paid.

These books can be purchased at The Aeronautic Library, Inc., 299 Madison Avenue, New York City.

THE WHITE TRANS-PACIFIC MONOPLANE

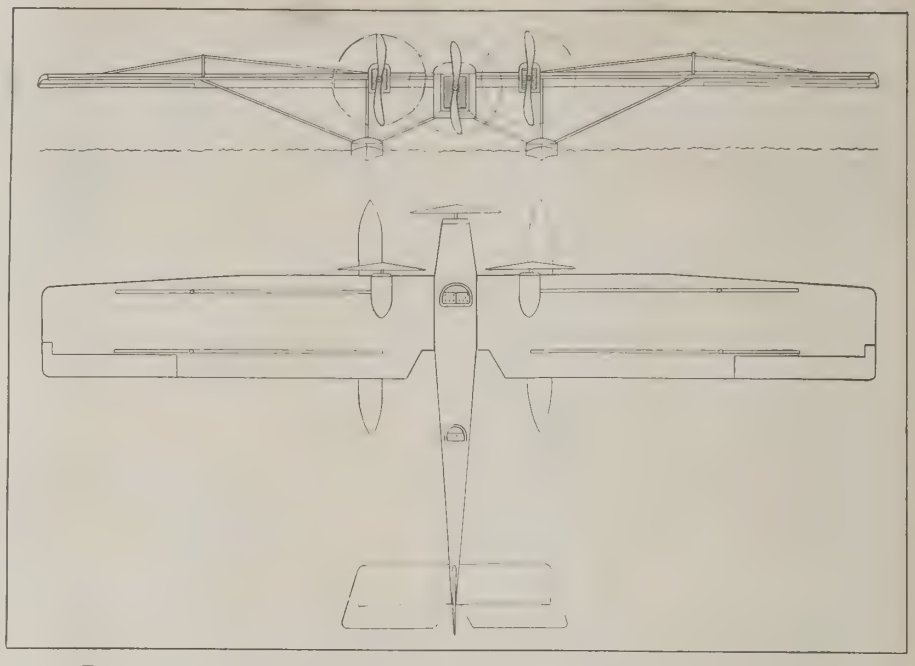
AT the Los Angeles factory of the George D. White Company the construction of a triple-motored monoplane is being pushed for the purpose of making a trans-Pacific flight. The White monoplane is of the seaplane type, having twin floats, and is the largest monoplane in the world. Full co-operation has already been secured, the route is mapped and the flight is scheduled to be made within the coming months. A northern route, as shown on the accompanying map, has been chosen as more suitable at this time.

Full co-operation along this route is assured by the Pacific Aero Club, Aerial League of Canada, and by the Governor of Alaska, Hon. Thomas Riggs, Jr., who is preparing arrangements for the stop at Sitka.

There seems no objection, according to Mr. Riggs, as the average temperature is from 53 to 60 degrees, which is not severe, despite the rather northern point.

From Los Angeles the first jump will be to San Francisco, a distance of 450 miles. From there to Victoria, B. C., a distance of 750 miles. From Victoria to Sitka, Alaska, is a jump of but 650 miles. From Sitka to Unalaska, on the Aleutian Islands, will be an oversea journey of 1,200 miles. This jump completes practically half the journey over the ocean. The next lap is from Unalaska to Petropavlovsk, Kamchatka. This is a 1,500-mile flight and one of the longest to be made, as although some of it is within sight of the islands, the greatest part is across the Pacific Ocean. Technically, the trans-Pacific flight would end here, but the machine will make another hop to Yokahama, Japan, another long flight, but one of comparative ease. The final jump will be to Shanhai, the end of the historic 7,000-mile trip.

A route via Hawaii and the South Pacific Islands has been suggested, but the White Company has decided that this would be impractical, as stops would have to be made either at the many small islands or a non-stop flight of 3,000 miles would need to be made. Although such a flight is not impossible, still one of that length has never been made, and it would be hazardous to the extreme to attempt it over unknown waters.



Front and plan views of the 660 H.P. three Hispano motored White Monoplane

The dimensions of the trans-Pacific White monoplane are as follows: Wing spread; 82 feet; length overall, 39 feet; height to top of fuselage, 9 feet; weight empty, 3,700 pounds weight with crew and fuel for the Pacific flight, 7,900 pounds. Total horsepower, 660, generated by three Hispano-Suiza engines. Two 180 H.P. engines are located one on each wing on each side of the body. The third engine, 300 H.P., is installed in the nose of the fuselage as in single-motored aeroplanes. The wings have a peculiar sweepback, raked tips and an angle of incidence of four degrees. The angles are so worked out that the monoplane has practically inherent and automatic laterial and longitudinal stability. All surfaces are balanced, making control simplified and untiring.

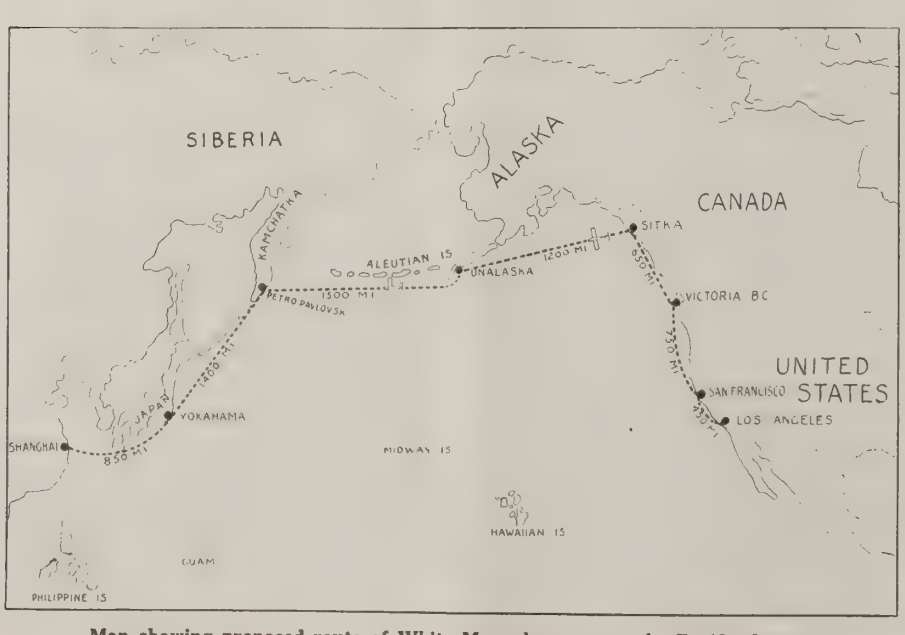
Either the two 180s or the one 300-H.P. engine will be used at one time, but all three are not to be used simultaneously. A speed of 110 miles an hour will be given by 300 H.P. By having approximately the same amount of power in reserve as is being used, the possibility of failure is lessened. At the start, the two 180s will be used with the 300-H.P. center engine in reserve. After running a number of hours the central engine will be switched on and the two smaller engines shut off. This method will be followed throughout the entire flight, which allows the engines to rest, and also allows the engine expert to make an inspection and the necessary minor adjustments; new spark plugs can be installed, carburetor adjustments made, ignition troubles overcome, or other minor requirements which, under ordinary conditions, mean motor failure and an interrupted flight.

The White truss system is used in the construction of the wings; no wires are used in the construction whatever, and no cables for the controls or other parts.

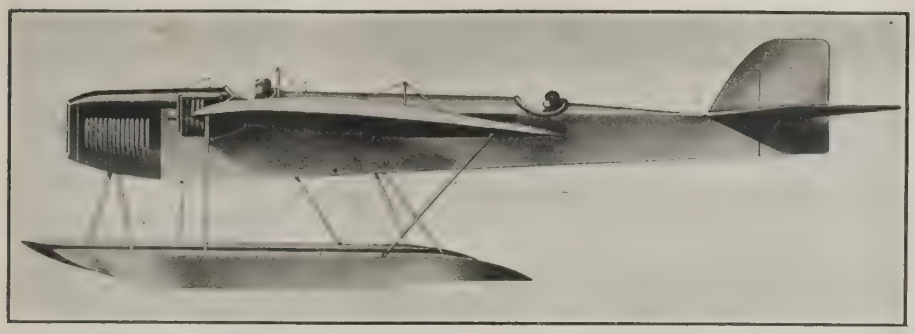
The fuselage is constructed as a compact unit, with no wires or turnbuckles. The fuselage is built of Haskelite, a strong veneer built up of Oregon spruce and African mahogany, which is cemented together under hydraulic pressure. This gives enormous strength, is water-tight and gives perfect alignment.

The pontoons, two in number, are spaced 15 feet apart, and extend more than half the entire length of the machine. They are constructed of mahogany and cedar veneer, and are divided into many compartments, sectioned with bulkheads. Either pontoon is capable of supporting the entire machine.

The principal object in the White Company's entry to cross the Pacific Ocean is to blaze the way along a practical route that can be followed later in practical service. In view of the fact that great import trade is springing up with the Far



Map showing proposed route of White Monoplane across the Pacific Ocean



Side view drawing of the White Trans-Pacific Monoplane

East, a quick passage for mail and light express is a necessity, and the route planned is estimated to take three days, compared with three weeks by the fastest boat.

It has been pointed out that should the rules of the Thomas H. Ince prize bar the machine from participation due to the northern route chosen, the flight will be made in any event. Later it is planned to remodel the monoplane, substituting a landing gear for the floats, and attempt to make a non-stop flight from Los Angeles to Chicago.

HELIUM

UP to the present time all military and most other balloons have been filled with hydrogen. This gas, although giving the greatest lift which it is possible to secure, is so highly inflammable as to make the destruction of balloons by fire, not only in war time, but during operations under ordinary conditions, a serious matter. For example, the writer happens to know personally of twenty-six cases in which kite balloons or dirigibles have been completely destroyed by fire, caused by atmospheric or frictional electricity, during the last two years. Many attempts have been made to minimize this fire hazard by fire-proofing balloon fabrics, and by use of hot air or ammonia in place of hydrogen, but so far without success. The use of helium instead of hydrogen affords absolute safety from fire, whether caused by accidental electric sparks or by incendiary or explosive bullets of an enemy in time of war. An adequate supply of helium will, therefore, entirely revolutionize balloon practices, and will do more than any other one thing to assure to the nation possessing it, that control of the air which will in the future be absolutely necessary for any adequate plan of National Defense.

The history of helium is interesting. About 70 years ago, a line was discovered in the spectrum of the sun's atmosphere, which could not be identified as belonging to any element known on the earth. This unknown gas was, therefore, named helium. Many years later, a thimble full of a gas, occurring in very minute quantities in the earth's atmosphere, was isolated by Sir William Ramsay, and proved to be the hitherto unknown element to which the name helium had been given. It was then proved to be not only incombustible but inert in every other chemical way and to have about twice the density of hydrogen. Still later it appeared that this gas is formed whenever radium or any other radio active material disintegrates and for a time active chief source from which helium was obtained in small quantities for scientific research was certain radio active minerals. Still later helium was found to be a constituent of certain natural gases, particularly those occurring in Southern Kansas, parts of Oklahoma and Northern Texas, and processes were developed at the University of Kansas for purifying it so cheaply that it could be sold to scientists, in small quantities, at something like $1700.00 per cubic foot. At that time the total quantity of reasonably pure helium in the world was probably less than 100 cubic feet. In the face of so discouraging an outlook, some one in the British Admiralty had imagination enough to propose seriously, that helium should be produced in sufficient quantities for the British Balloon Service, and experiments were undertaken in Canada for this purpose. A report on this matter was found in a mess of British documents sent to this country soon after we entered the war, by the Gas Warfare Committee of the Bureau of Mines and the matter was brought to the attention of the Signal Corps and the Burtau of Steam Engineering. Since that time about six millions have been either spent or obligated, the entire practicability of the production of helium on a large scale at a cost of ten to fifteen cents per cubic foot has been demonstrated, and production plants to yield 40,000 to 60,000 cubic feet per day are now being constructed or under test.

Three processes, alike in fundamental principles, but differing in important details, are being tried. One of these, the Linde process, has demonstrated its success and is the basis of the production plant now being built. The second, the Claude process, gives promise of a somewhat lower operating cost than the Linde process, but has not yet been entirely perfected. At present, this plant is temporarily shut down until the new Government pipe-line can provide it with an adequate supply of undiluted Petrolia gas, at which time the final test will be made. The third process, invented by Norton and developed by the Bureau of Mines, is the basis of the large experimental unit in Plant No. 3. This unit is still being worked into shape by Norton, the inventor, and it is hoped that satisfactory results will be forthcoming within the next two months. It gives promise of an operating cost lower than either of the others.

The active supervision of the production program for helium, with the exception of Plant No. 3, has been placed in the hands of the Navy Department by mutual agreement between the Army and Navy. All that it is necessary for the Army to do at the present time, is therefore, first, to keep in touch with the work the Navy is doing in behalf of both Departments; second, to prepare itself for the proper utilization of the helium that will be supplied to it under the agreement with the Navy, and third, to assume the responsibility of providing an adequate supply of the necessary raw material, in the future.

It is further suggested that there is much to be done before the Army will be ready to use this new gas in the most effective way. A small repurification plant has already been authorized and plans for it are nearly completed. The question of modifying the designs of the various types of balloons in use, so as to make them appropriate for helium, should be undertaken at once. The chief difficulty is connected with the very large waste of gas involved in the methods of handling balloons at present in use. This waste of gas will have to be very largely reduced by careful experimentation and by changes both in balloons and in the manual of tactics before the use of helium in balloons of the Army types will be justified from the point of view of the whole problem of National Defense.

Finally, it must be remembered that the supply of helium in the United States, although large, is by no means unlimited. At the present time probably a million cubic feet per day is being fed through the natural gas mains of various cities in the Middle West and being dissipated into the atmosphere through thousands of chimneys. Steps should be taken at the earliest possible moment to secure for the Army and Navy the right to process all supplies of natural gas containing usable quantities of helium before this gas is distributed. The details of such a procedure will require careful study and for this purpose an Argon Conservation Committee consisting of a representative of the Navy, a representative of the Army and a representative of the Bureau of Mines was appointed last August by the Aircraft Board and an adequate allotment to cover its expenses recommended. For various reasons effective action by this Committee has seemed impossible until very recently. It is now hoped that the Committee can proceed with its work in the near future.

Book Review

THE AMERICAN AIR SERVICE, *compiled by Arthur Sweetser*, with an introductory chapter written by Newton D. Baker, Secretary of War. This is a story of American military aviation. Every phase of our war program and many facts unknown to the public, such as hitherto unpublished figures, cablegrams and other data are included in this valuable historic volume. Beginning with the early experiments, the author traces briefly the rapid advancement in aeronautics. This is an invaluable book and every aeronautical enthusiast should have it in his or her library for future reference. Price $2.75, post paid.

This book may be purchased at The Aeronautical Library, Inc., 299 Madison Avenue, New York City.

NAVAL and MILITARY AERONAUTICS

4,844 American De Havilands Delivered to Date

Washington, D. C.—The Bureau of Aircraft Production received during the week ended July 15, two De Haviland 4 planes, making a total of 4,844 produced to date.

The table shows deliveries of De Haviland 4 planes (including 204 without engines used in A. E. F. as spares) before and after the armistice:

	Deliveries	Per cent of total
Before armistice.....	3,431	71
After armistice.....	1,413	29
Total	4,844	

265 Seaplanes to Be Sold By Navy

Washington, Aug. 2.—Acting Secretary of the Navy Roosevelt anounces that Secretary Daniels has authorized the sale of 265 seaplanes belonging to the navy. Mr. Roosevelt says that the sale of these machines will give commercial aeroplane transportation companies an opportunity to buy high-speed machines of large carrying capacity ready for immediate delivery. He says that a number of such routes are already in operation or contemplated in the near future, such as from New York to Atlantic City, San Pedro to Santa Catalina, Key West to Havana, Chicago to Milwaukee and other lake cities, and a projected route to the Bermuda Islands.

The sale will include 83 RS-2 pusher biplanes, each with 330 horsepower Liberty motors; also 72 H-6 and F-5 tractor biplanes, each with two 330 horsepower Liberty engines.

The Bureau of Supplies and Accounts, salvage and sale section, will issue complete schedules of the sale, giving the characteristics of all the machines to be sold, their location, appraised value, specifications and terms.

Aircraft Appropriation Withdrawals

Washington, D. C.—The unused balance of the appropriation for the fiscal year ending June 30, 1919, as modified by the Third Deficiency Act for the Bureau of Aircraft Production amounts to $170,743,000 of the $360,647,000 appropriation, the withdrawals amounting to $189,904,000. For the Department of Military Aeronautics the appropriation was $107,469,000, withdrawals $27,328,000, balance $80,141,000, according to a statement issued by the Statistics Branch of the General Staff on July 23.

The withdrawals during June for the Bureau of Aircraft Production were $18,626,000 or 9 per cent of the total; the Department of Military Aeronautics withdrew $1,681,000 during June.

Gale Wrecks Army Bombers

Mineola, N. Y.—Five aeroplanes, including the Martin bomber intended for the one-stop transcontinental flight, the Caproni bomber and a Handley Page bombing plane, were wrecked when a terrific thunderstorm passed over Hazelhurst Field, dismantled buildings and uprooted huge trees. A Caproni triplane, almost completed, was badly damaged by the wind. The damage totals several hundred thousand dollars.

Sales of Surplus Supplies

Washington, D. C.—The Statistics Branch of the General Staff reports the sale of the following supplies: Department of Military Aeronautics, week ending July 18, $801; total to July 18, $3,497,324; estimated value of supplies, Jan. 1, 1919, $85,000,000; estimated cost of material sold, $21,800,000; per cent of material sold, 26.

The figures for the Bureau of Aircraft Production are: Sales for week ending July 18, $296,447; total to July 18, $4,360,207; estimated value of service January 1, 1919, $62,000,000; estimated cost of material sold, $7,600,000; per cent sold, 12.

The unliquidated contracts for the Air Service represent but 9 per cent of unliquidated War Department contracts.

No Reductions in Army Pay

Washington, D. C.—Instructions are being sent to the Commanding General of each depot, the commanding officer of each camp, post or station and each recruiting officer, in effect that newspaper reports that pay of enlisted men will revert after the recent emergency to pre-war scale are incorrect; that the appropriation bill for the fiscal year 1920 provided that provisions of Act approved May 18, 1917, in so far as it increased the pay of enlisted men of the Army, are continued in force and in effect from and after the date of approval of this appropriation act of 1920. It is directed that all concerned give wide publicity to these facts.

Dimensions of Navy Dirigible Hangars Announced

Washington, D. C.—According to information disclosed by Secretary Daniels regarding the naval dirigible hangar to be erected at Lakehurst, N. J., it will be 800 feet long, 265 feet wide, and 174 feet high. These are inside dimensions. The great concourse is 760 feet long, 126 feet wide, and 50 feet high.

The outside dimensions of the hangar are even greater. The space actually occupied will be 920 feet long and 352 feet wide, and the structure will be more than 200 feet. The doors, of which there will be four, two at each end, are 129 feet wide and 174 feet high.

The steel tonnage will exceed 6,000 tons, and the cubic contents of the building will be 50,000,000 feet. It will be covered with colored, corrugated asbestos, which will make it fireproof. A series of windows and skylights on all sides will afford ample light, while there will be numerous staircases and two huge elevators leading to the roof. In the spaces between the great trusses will be placed numerous shops for the use of the aviators.

Three railroad tracks will run the length of the hangar. The building will hold one 10,000,000 cubic feet ship and two smaller ones at the side, or two 5,000,000 cubic feet ships side by side.

Victory Ribbon Bars Buttons and Medals Being Distributed

Washington, D. C.—The War Department announces that the Victory ribbon bar, the Victory button and the Victory Medal are now available for distribution at Army posts, camps and recruiting offices.



The motor truck unit for captive balloons mounts not only the power driven winch, but spare parts, telephone apparatus, scientific instruments, camping paraphernalia, etc.

(*Continued from page* 1004)

the President, or of the Secretary of Aeronautics under the direction of the President, shall have supervision of all Air Forces of the line and of the staff divisions of the Air Forces hereinbefore mentioned and shall perform such other duties pertaining to aeronautics not otherwise assigned by law, as may be assigned to him by the Secretary of Aeronautics, and ten brigadier generals, ninety-eight colonels, two hundred and five lieutenant colonels, four hundred and fifty majors, seven hundred and eighty-five captains, nine hundred and ninety first lieutenants, one thousand one hundred and forty second lieutenants, who will be commissioned in the line of the Regular Air Force; and one brigadier general, fourteen colonels, twenty-five lieutenant colonels, forty-five majors, eighty captains, who will be commissioned in the Administrative Division of the Regular Air Force; and one brigadier general, seven colonels, ten lieutenant colonels, fifteen majors, twenty captains, who will be commissioned in the Legal Division of the Regular Air Force; and one brigadier general, fifteen colonels, twenty-five lieutenant colonels, forty majors, eighty captains, one hundred and twenty first lieutenants, two hundred and thirty second lieutenants, who will be commissioned in the Supply Division of the Regular Air Force; and one brigadier general, fourteen colonels, twenty lieutenant colonels, thirty-five majors, seventy captains, one hundred first lieutenants, one hundred and fifty second lieutenants, who will be commissioned in the Engineering Division of the Regular Air Force; and one brigadier general, seven colonels, fifteen lieutenant colonels, twenty majors, sixty-five captains, one hundred and ten first lieutenants, who will be commissioned in the Medical Division of the Regular Air Force: *Provided,* That not to exceed two brigadier generals, eight colonels, twenty lieutenant colonels, and twenty majors of the line of the Regular Air Force may be detailed in the Operations Division: *Provided further,* That officers holding permanent commissions in the Army, Navy, or Marine Corps, now serving, or who have served, in the Army Air Service, the Naval Flying Corps, or the Marine Corps Flying Corps between April 6, 1917, and November 11, 1918, and such temporary officers of the Army, Navy, and Marine Corps, as hold active commissions in the aviation branches thereof at the time of the passage of this Act, shall be eligible for appointment and commission in the Regular Air Force without examination: *Provided further,* That such emergency officers of the Army, Navy, and Marine Corps, who served honorably and at least thirty days on active duty between April 6, 1917, and the passage of this Act, with the Army Air Service, the Naval Flying Corps, or the Marine Corps Flying Corps, shall be eligible for appointment and commission in the Regular Air Force: *Provided further,* That at least 20 per centum of the grades hereinbefore mentioned, below that of major general and above that of second lieutenant, shall not be filled until six months after the passage of this Act, at which time they shall be filled by promotion of the then commissioned officers of the Regular Air Force, under such regulations as may be prescribed by the Secretary of Aeronautics, and, that after one year after the passage of this Act, promotions shall be governed by the rules of seniority. And that the number of second lieutenants hereinbefore authorized is hereby increased in the number of six hundred and ninety until such time as promotions to the grades hereinbefore reserved shall reduce the number of second lieutenants to one thousand five hundred and twenty: *Provided further,* That the pay and allowances, including increased pay for participating frequently and regularly in aerial flights, shall be the same as that now provided by law for commissioned officers of the Army, including retirement: *Provided further,* That increased rank will not be given commissioned officers on account of any ratings authorized for aviators or aeronauts.

Sec. 11. That the grade of pilot shall be, and is hereby, authorized. Pilots shall be known as warrant officers of the Regular Air Force and shall rank with but after second lieutenants: *Provided,* That the pay and allowances of pilots shall be the pay of a second lieutenant and the allowances of a master electrician, and they shall be eligible for retirement after serving the same number of years required by law for enlisted men: *Provided further,* That not to exceed two thousand may be warranted in this grade: *Provided further,* That former officers of the temporary forces of the Army, Navy, and Marine Corps, reserve officers provided for in section 13 of this Act, and enlisted men of the Department of Aeronautics shall be eligible for appointment as warrant officers after passing such practical and theoretical tests in aeronautics as may be prescribed by the Secretary of Aeronautics: *Provided further,* That the appointment of an enlisted man as a warrant officer shall not discharge him from his enlistment.

Sec. 12. That the enlisted strength of the Air Force shall not exceed fifty thousand men and shall consist of master electricians, sergeants (first class), mess sergeants, chauffeurs (first class), sergeants, chauffeurs, corporal, buglers (first class), burglers, privates (first class), and privates, the number of each grade being fixed by the President from time to time: *Provided,* That all enlisted men of the Army, Navy, or Marine Corps on aviation duty at the time of the passage of this Act may be discharged from the Army, Navy, or Marine Corps and reenlisted in the grade of the Regular Air Force carrying the nearest pay to that which they held when discharged: *Provided further,* That the term of enlistment in the Regular Air Force shall be for one or three years: *Provided further,* That the pay and allowances of enlisted men in the Regular Air Force shall be the same as the corresponding grades and ratings of the Regular Army, including the increased pay for participation in aerial flights: *And provided further,* That any enlisted man who may qualify therefor shall be given the rating of aviation mechanician.

Sec. 13. That the Reserve Air Force of the United States shall consist of an Officers' Reserve, available for service as temporary officers of the Regular Air Force, as officers of the line, and of the various staff divisions provided for in this Act under such rules and regulations as the President may prescribe not inconsistent with the provisions of this Act. The President shall be authorized to appoint and commission as reserve officers in the line and the various staff divisions of the Reserve Air Force in all grades up to and including that of major, such citizens as, upon examination prescribed by the President, shall be found physically, mentally, and morally qualified to hold such commissions: *Provided,* That the proportion of officers in any section of the Reserve Air Force shall not exceed the proportion for the same grade in the corresponding section of the Regular Air Force, except that the number commissioned in the lowest authorized grade in any section of the Reserve Air Force shall not be limited. All persons now holding commissions in the Aviation Section Signal Reserve Corps, or in the Aviation Section of the Naval Reserve Force and the Marine Corps Reserve, shall, for a period of three years after the passage of this Act, be eligible for appointment in the Reserve Air Force in the rank nearest that held in the Army, Navy, or Marine Corps Reserve at the time of the passage of this Act without further examination: *Provided,* That such of these as hold commissions as colonel or lieutenant colonel may be commissioned in that rank, but when such persons thereafter shall become separated from the Reserve Air Force for any reason, the vacancy so caused shall not be filled, and such office shall cease and terminate. The commissions of all officers of the Reserve Air Force shall be in force for a period of five years, unless sooner terminated in the discretion of the President.

Sec. 14. That in time of actual or threatened hostilities, the President may order officers of the Reserve Air Force, subject to such physical examination as he may prescribe, to temporary duty with the Regular Air Force. While such reserve officers are on such service they shall exercise command appropriate to their grades and rank and shall be entitled to the pay and allowances of the corresponding grades in the Regular Air Force from the date upon which they shall be required, by the terms of their orders, to obey the same, to the extent provided for from time to time by appropriations for this specific purpose. The Secretary of Aeronautics is authorized to order reserve officers to active duty for instruction for periods not to exceed thirty days in any one calendar year, and while so serving such officers shall receive the pay and allowances of their respective grades in the Regular Air Force: *Provided,* That with the consent of the reserve officers concerned and within the limits of funds available for the purpose, such periods may be extended as the Secretary of Aeronautics may direct.

Sec. 15. That no reserve officer appointed pursuant to this Act shall be entitled to retirement or to retired pay, and shall be eligible for pension only for disability incurred in line of duty in active service or while serving with the Regular Air Force pursuant to the provisions of this Act.

Sec. 16. That the National Guard Air Force shall consist of such members of the organized militia of the several States, Territories, and insular possessions, commissioned and enlisted, who desire to be and are accepted for service, in the Department of Aeronautics, under such regulations as the President may prescribe.

Sec. 17. That the Secretary of Aeronautics shall annually, at the close of each fiscal year, make a report in writing to Congress, giving an account of all moneys received and disbursed by him and his department, and reporting on the work done by the department.

Sec. 18. That all laws prescribing the work and defining

(*Continued on page* 1030)

FOREIGN NEWS

Sir Isaacs Describes New Radio Aid to Aerial Navigation

Speaking at a luncheon of the Aldwych Club recently, Godfrey Isaacs, managing director of the British Marconi Company, told of a new plan his company had for enabling aviators to tell where they were. After mentioning the wireless direction finder, Mr. Isaacs said:

"A further development had given them a new transmitter, which would project into the air a wide divergent beam, something like a searchlight without the light, which would extend over any area required, or, if it was desired, a concentrated beam over some small place, and those beams would convey to the men in the sky automatically the name of the place they were passing over.

"Assuming that a man was passing over the town of Guildford; from the moment he traversed the region over which this beam was playing he would receive the signal, 'This is Guildford,' and would continue to receive that signal as long as he was over Guildford and no longer. In the same way, if he was passing over Windsor Forest he would be told, 'This is Windsor Forest,' and when he came to his aerodrome a beam would tell him, 'This is Hendon Aerodrome!' In that way he thought that one of the greatest dangers to pilots in fog and in darkness was disposed of.

"It required very little imagination to see, a little while hence, some thousands or tens of thousands of names being projected into the skies, so that in whatever part of the world an aeroplane might travel, it would be told continuously and automatically where it was. It would be as easy to learn in the skies where they were as in a railway train when they looked out of the window to see the name of a station.

"Similarly these beams could be equipped to lightships or to buoys in fixed and defined positions, so that even when passing over the sea one would know exactly where one was. When that position of things had developed pilots would no longer lose themselves, wherever they might be."

First Westward Flight Across South America

Santiago, Chile.—Lieut. Locatelli, a member of the Italian Aviation Mission now in Argentina, completed on July 30 an aeroplane flight from Buenos Ayres to Valparaiso, his trip marking the first crossing by air of the South American continent from the Atlantic to the Pacific.

Lieut. Locatelli several days previous covered the first stage of the flight, from Buenos Ayres to Mendoza, on the eastern edge of the mountains, where he waited for good weather. He started early July 30 to complete the flight, crossed the Cordillera of the Andes, and after circling over Valparaiso landed at Vina del Mar, near that city. Later he flew to Santiago, landing at the aerodrome of the Chilean Military Aviation School.

The Italian aviator acted as an aerial mail pilot, bringing several sacks of mail matter from the Mendoza post office and a number of private letters. He was greeted on landing in Chile by members of the Italian colony.

Lieut. Locatelli saw service during the war on the Italian front. He took part in one of the raids over Trieste by Gabriele D'Annunzio's squadron.

Trans-Mediterranean Flight in 5 Hours 40 Minutes

Paris—Capt. Morchal, an aviator, who tried to fly from France to Russia during the war, but was obliged to land in the Austrian lines on July 19, flew in a hydroaeroplane from St. Raphael, Department of Var, across the Mediterranean to Bizerta, Tunis. Capt. Morchal covered the distance of about 450 miles in five hours and forty minutes.

Hydroaeroplane to Explore Congo River Valley

Brussels (Correspondence of The Associate Press).—The Belgian Committee on Aeronautics has decided on the creation of a line of hydroaeroplanes for the Congo colony.

Besides mail and passenger transport hydroaeroplanes are to undertake an important cartographic mission covering thousands of miles, with a view to establishing the cartography of the Congo River. King Albert has contributed to the aerial fund of the mission.

Aerial Transport in Hawaii

Honolulu, H. T.—The air service squadron stationed here is now making frequent flights between Hilo on Island Hawaii, outward distance north of Molokai and Maui 230 miles, and return trip south of Maui over the Alalakeiki Channel, the Auau Channel north of Lanai and south of Molokai, distance 15 miles. Instead of going on a small steamer, a journey of two days, a letter was carried for the Governor of the territory by aeroplane in two hours.

The Farman F-50 Biplane

The F-50 biplane, equipped with twin 275-H.P. Lorraine engines, is being converted for carrying eight passengers. The only structural changes are that a cabin is raised above the top longerons of the fuselage with windows surrounding the entire compartment, completely enclosing the six passengers, pilot and mechanician. The upper wing has a span of 22.35 m.; lower wing, 20.40 m. The over-all length of fuselage is 10.92 m., and height over-all is 3.60 m. Chord, 2.35 m.

Weight, empty, 1800 kg.; useful load, 800 kg. Fuel load, 510 kg. Total load of machine complete, 33,110 kg. The F-50 makes a speed of 150 km. an hour.

Caproni Biplane Carries Fifteen Passengers for 220 Miles

According to information from the Caproni Company, a Caproni passenger-carrying biplane made a flight from Milan to Turin and back, with a load of fifteen passengers, in two hours. The distance is 220 miles.

Fiat Flies 158 Miles an Hour with Two Passengers

Flying a Fiat BR biplane, Mr. Brack-Papa established a world's record, on June 27th, by attaining a speed of 255 kilometers an hour (158½ miles) with two passengers aboard. The flight was officially controlled and the speed certified by a Commission of the Aero Club of Italy. This is the highest speed ever attained in any element; the previous record was 143 miles an hour, established by the Frnch pilot Sadi-Lecoint on a two-seater Spad biplane.

Brack-Papa and his two passengers made their official flight over the Mirafiori aerodrome, in the suburbs of Turin.

British Ministry of Munitions Work Summarized in Parliament

London, Eng.—In his speech in the House of Commons on June 24 introducing the Ministry of Munitions Vote, Mr. Kellaway said that at the outbreak of war the British Army had in its possession about 100 aeroplanes. The Ministry became responsible for aeroplane production on September 12, 1917, when the production had increased to 500 aeroplanes per month. At the date of the armistice—a little more than 18 months later—production had been increased to 4,000 per month. At a time when raw material and machinery was very largely engaged on other essential war production this country was able, thanks to the ingenuity of its craftsmen and the farsightedness of its captains of industry, to make so great a step forward in its aircraft production as that, and the improvement in the fighting quality and the safety of the machines was just as great as the increase in the numbers. There was no question amongst informed men that during the latter stages of the war this country held the supremacy over her enemy in the air. That was due not only to the extraordinary fighting spirit and ingenuity of the men who flew and fought the machines, but also to the ingenuity and patriotism of the craftsmen and the employers engaged in that great industry.

Commercial Air Routes Being Established Throughout Italy

(Translated from *Noi & Il Mondo,* Rome).—In Italy, public and private energies seem to turn to the question of aerial postal service and transportation. All official commission has created a code for the air, and has laid out a vast network of aerial routes which start from the Maritime Alps and from the Julian Alps, descend the Mediterranean Coast and the Adriatic to Otranto. One route connects all the cities of the frontier; other routes cross the Apenines and join the coast routes. Along the lines now ready there are more than 80 hangars and as many intermediate landing places.

It is the design to connect the cities of the continent with the islands; and there already exists the Rome-Naples route. Some days ago an enormous biplane carrying 10 passengers, covered the distance between Milan and Rome in 4 hours and 45 minutes, landing comfortably at Centocelle. Arrangements are advancing rapidly for the practical operation of a postal air line including Naples, Palermo, Tunis, Tripoli. But there is still much to do.



The Farman F-50 type B.n. 2, equipped with two 240-275 h.p. Lorraine engines, which is also remodeled for carrying pilot, mechanician, and six passengers with their baggage



ELEMENTARY AERONAUTICS
and
MODEL NOTES

By John F. McMahon



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BUFFALO AERO SCIENCE CLUB
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Results of Illinois Model Aero Club's Contests

On July 6th the Illinois Model Aero Club held a hand-launched and R. O. G. distance contest at Ashburn Flying Field for the Villard Cup and AERIAL AGE prizes. The judges were Messrs. Walter L. Brock, E. M. Lair, and James S. Stephens. The contestants were Messrs. Joseph J. Lucas, William Schweitzer, Ellis C. Cook, Ward Pease, and Robert Jaros.

All of the models were twin pushers powered with rubber bands. The record of the contests is as follows:

	Hand Launched	R. O. G.
Lucas	(1) ..... 1,464 ft.	(1) ..... 1,248 ft.
	(2) ..... 1,127 ft.	(2) ..... 1,447 ft.
	(3) ..... 1,148 ft.	(3) ..... 504 ft.
	Total. 3,739 ft.	Total. 3,199 ft.
	Average.. 1,246 1/3 ft.	Average.. 1,033 ft.
Schweitzer	(1) ..... 2,778 ft.	(1) ..... 1,101 ft.
	(2) ..... 1,262 ft.	(2) ..... 1,805 ft.
	(3) ..... 1,329 ft.	(3) ..... 1,006 ft.
	Total. 5,369 ft.	Total. 3,912 ft.
	Average.. 1,789 2/3 ft.	Average. 1,304 ft.
Cook	(1) ..... 1,771 ft.	(1) ..... 1,085 ft.
	(2) ..... 1,709 ft.	(2) ..... 755 ft.
	(3) ..... 1,760 ft.	(3) ..... 705 ft.
	Total. 5,240 ft.	Total. 2,545 ft.
	Average.. 1,746 2/3 ft.	Average.. 848 1/3 ft.
Pease	(1) ..... 2,410 ft.	(1) ..... 452 ft.
	(2) ..... 1,603 ft.	(2) ..... 710 ft.
	(3) ..... 946 ft.	(3) ..... 703 ft.
	Total. 4,959 ft.	Total. 1,865 ft.
	Average.. 1,653 ft.	Average.. 621 2/3 ft.
Jaros	(1) ..... 2,108 ft.	(1) ..... 800 ft.
	(2) ..... 1,799 ft.	(2) ..... 1,273 ft.
	(3) ..... 1,116 ft.	(3) ..... 625 ft.
	Total. 5.023 ft.	Total. 2,698 ft.
	Average.. 1,674 1/3 ft.	Average.. 899 1/3 ft.

Total average for five contestants..... 4,706 1/3 ft.
Club average..... 941 4/15 ft.

Illinois Model Aero Club Meet

By Jos. J. Lucas

The Illinois Model Aero Club held a Gala Day Hydro Meet on July 13th at Lake Calumet. This Hydro Meet was one of the series for the Laird-Weaver Trophy, which is to be awarded to the member making the best showing in all the model meets held for the year. The men who had hydro models were the Messrs. Wricon, Wells, Pond, Jaros, Schweitzer, Lucas, Hittle, and Pease.

Many long duration hydro flights were made and Mr. William Schweitzer made the best average for his three official flights, winning also the special prize offered by Mr. Partridge for the best duration flight, which was 96 seconds.

The next model aeroplane meet of the Illinois Model Club will be held on August 10th for hand-launched duration and many entries are expected.

Scale Model of Curtiss J N 4 B

Mr. Louis E. Heim, of 421 E. 137th Street, Bronx, N. Y., has built a model of a Curtiss JN 4 B from a description which appeared in AERIAL AGE.

The dimensions of the model are as follows:

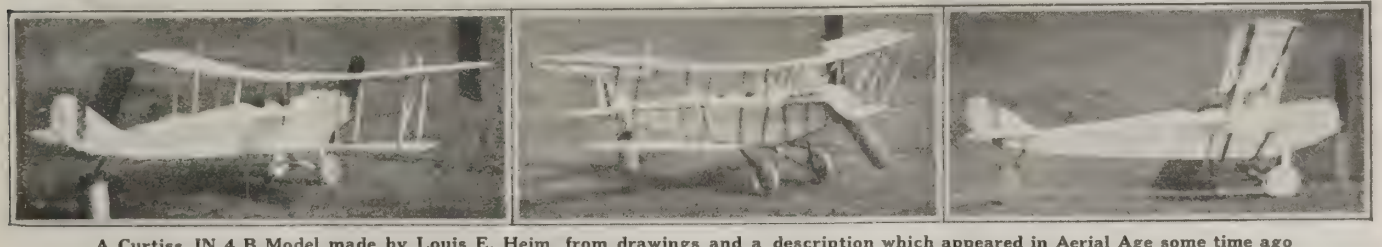
Span, upper wing	32¾ in.
Span, lower wing	25½ in.
Chord, both wings	3¾ in.
Overall length	25 in.
Gap	4½ in.
Weight	12 oz.

The model is fitted with sufficient rubber band motive power to enable it to fly 100 feet or over. There is an eight-cylinder dummy motor at the head with a radiator attached.

The landing chassis consists of two struts with brass fittings attached with cotter pins, with an axle ⅛" in diameter running through, on which is attached two 2" aluminum disc wheels.

The wings have a dihedral of ¾". The struts are fastened by means of brass terminal fittings which are attached to the main beams by means of small screw-eyes which are good supports for the wires.

The rudder is fastened by means of wires running through the fuselage to the cockpit, where they are attached to a stick (similar to stick control). The cockpits are fitted with small windshields made of celluloid, which gives a realistic appearance to the machine.



A Curtiss JN 4 B Model made by Louis E. Heim, from drawings and a description which appeared in Aerial Age some time ago



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Military Efficiency

During the war a colonel of the cavalry, assigned to take charge of an aviation field, spent the first day looking through the various departments of his new post.

Surprised at finding so many broken landing gears in the repair rooms, he inquired the reason and was informed that the cause was bad landings on the part of student aviators. Forcibly impressed by this apparent waste and determined to eliminate it, he immediately went to headquarters and issued an order that no more bad landings would be tolerated at that field.

—O. L. D.

The Flying Dutchman: 1919 Version

The soul of a viking wandered down in the wake of a roaring gale
From the frozen bergs in the polar sea that long dead Norsemen sail,
The crystal fleets from the glaciers launched, that lift their ghostly spars
In the flicker and flare of the Northern Lights and the gleam of the cold white stars.
"I want a ship," said the viking's soul, "to speed in the tempest's teeth
When the lash of the wind flails fast and hard the foaming waves beneath.
I would feel the thrill that I felt of yore when I sang to the rhythmic sweeps,
And a new shore rose for my conquering from the haze of unknown deeps."

He came to the wild Newfoundland coast and saw in a lonely place
A strange, long ship that tugged and tore like a stallion keen for a race.
"Now here," he cried, "is a noble craft. Ho! this is the ship for me."
And he leaped aboard the long C-5 and sailed away to sea.
Far up in the chill gray fog that hangs and curtains the northern skies,
A rushing form in the Arctic storm, the vagabond airship flies,
And the sea king's hand that steered of yore the war boat out of the fjord
Now guides the great dirigible hence where never its kind has soared.

The Flying Dutchman rests below, but the flying blimp will haunt
The Banks for many a stormy year the fisherman's heart to daunt,
A shape half seen in the rolling clouds through the scudding mist and rain,
Careening out of the inky void and lost in the murk again.
The sailor beating against the wind to the urge of the angry surge
Will see from the gloom of a sudden squall a shadow black emerge
And vanish into the seething night, and will bellow, "Look alive!
There goes the wandering navy blimp, the runaway ship C-5."

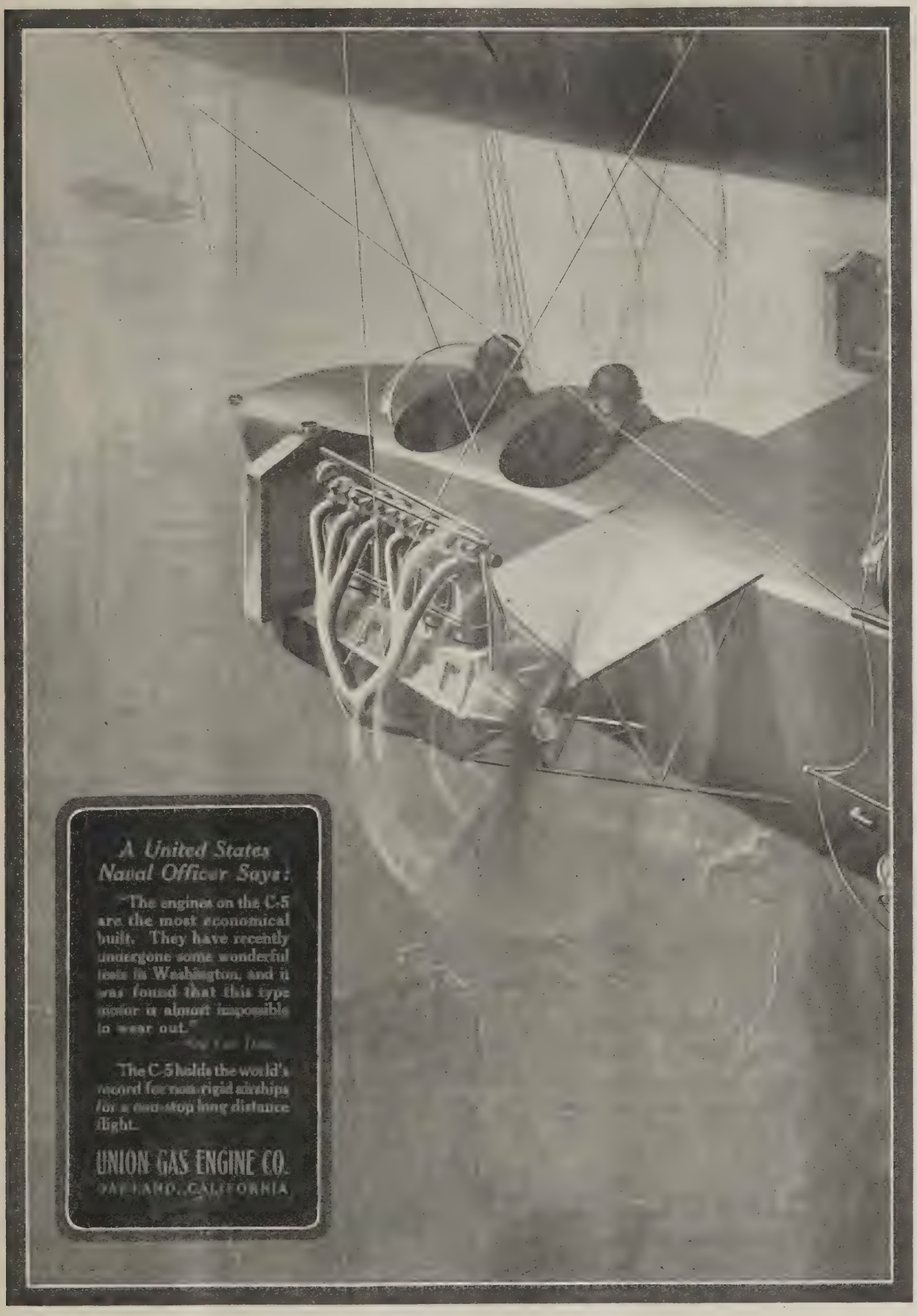
Minna Irving, in the New York Times.



A revised map of the Atlantic—Ket in the Oakland "Tribune"



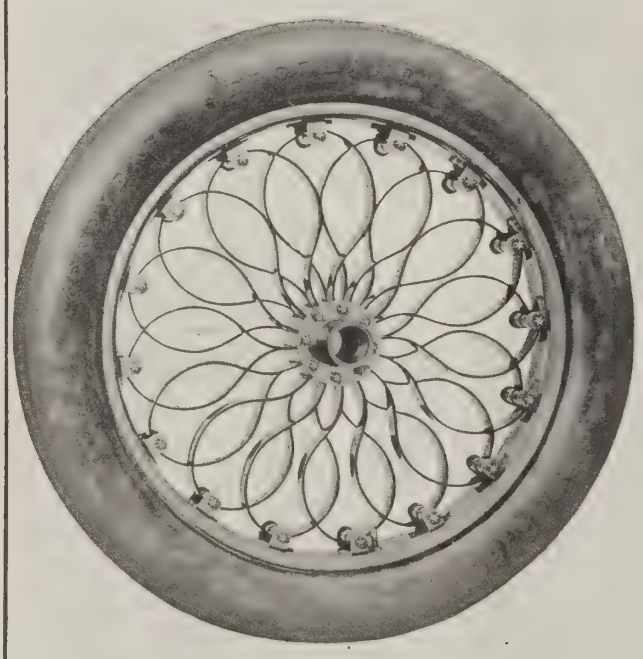
"Skeeter-Time"—Bronstrup in the San Francisco "Chronicle"


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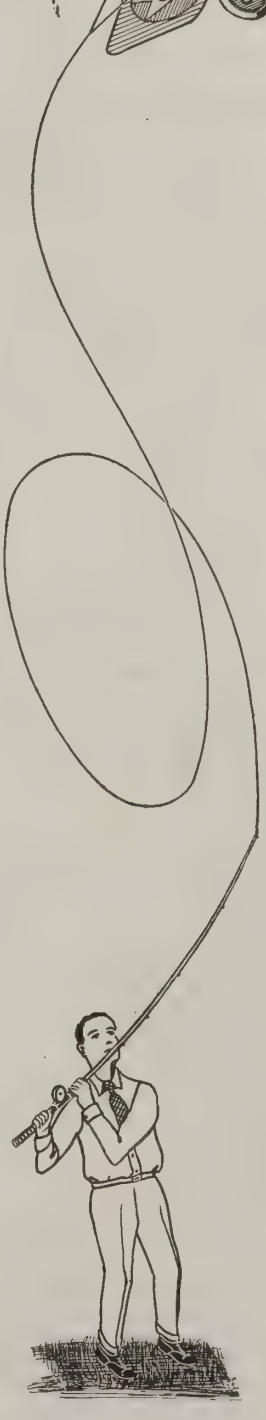
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FIRE—AUTOMOBILE—TORNADO—EXPLOSION—RIOT AND CIVIL COMMOTION

(*Continued from page* 1014)

it and the cam the end of a lever H fixed to a short shaft, which, at its other end, carries an arm provided with a roller J. All the nine rollers are arranged in one plane, and pass in turn over a curved cam surface K pivoted to a fixed point at one end, and at the other connected to an indicator handle under the pilot's control. At the ground level the cam K is set fully in so that, as each roller passes over it, the associated tappet is lifted off the cam A, B or C, and the exhaust valve is accordingly held open during a portion of the compression stroke. For starting purposes the cam K is set fully in and acts to the same end as the decompression gear provided on certain other aero engines. As the altitude increases the pilot progressively withdraws the cam out of action, so as to retain in the cylinder more and more of the air drawn into it during the suction stroke, until the normal height for which the engine is designed is reached, at which height the cam K is fully out of action, and the exhaust valve remains closed throughout the entire compression stroke. The actual compression ratio varies from 4.5 to 1 at or near the ground level up to 7 to 1 at high altitudes, although the compression volume remains constant throughout.

It is claimed that the introduction into the cylinder, during the first part of the suction stroke, of a large volume of air in advance of the inlet of the combustible mixture from the crank case, entirely eliminates all possibility of a back fire occurring through the retention in the cylinder of some part of the hot products from the previous working stroke. It is further claimed that the absence of inlet valves conduces to a like result, while being an advantageous mechanical feature for other reasons. Other features of the engine to which special attention is called are the very complete scavenging effected by the extended movement of the piston during the exhaust stroke, the central situation of the exhaust, the fact that all the connecting-rods are of the same size and shape, and the similarity of the functioning of all the cylinders.

Special Orders Nos. 170 to 175 Inclusive

Lieut. Col. John A. Paegelow will proceed to Washington, D. C., on temporary duty; thence to Army Balloon School, Lee Hall, Va., and report by letter to the Director of Air Service, Washington, D. C., for duty.

Lieut. Col. Ralph Royce will report to Fort Sam Houston, Tex., to the commanding general, Southern Department.

First. Lieut. Jesse A. Praether, Air Service, will report to the chairman of the Commission on Training Camp Activities, this city, for duty.

Maj. Archie W. Barry will proceed to San Antonio, Tex., and report in person to the commanding officer, Brooks Field, for duty.

First Lieut. Leo. F. Post will proceed to Mather Field, Sacramento, Cal.

Second Lieut. John W. Rankin will proceed to the aviation repair depot, Montgomery, Ala.

Capt. Phil A. Henderson will proceed to Fort Sam Houston, Tex., and report in person to the Department Air Service Officer, Southern Department, for duty.

Second Lieut. William Slade will proceed to Fort Sheridan, Ill., and report in person to the commanding officer, United States Army General Hospital No. 28, for further observation and treatment.

First Lieut. Bruce Struthers will proceed to Fort Bliss, El Paso, Tex., and report in person to commanding officer for assignment to duty with the 96th Aero Squadron.

Second Lieut. Yancey C. McDaniel will proceed to Petrolia, Tex., and report in person to the department air service officer, Southern Department, for duty as officer in charge of gas plant, No. 3.

Lieut. Col. Barton K. Yount will proceed to March Field, Riverside, Cal., and report by letter to the Director of Air Service, Washington, D. C., for duty.

First Lieut. Edmund T. Allen will report in person to the commanding officer, Langley Field, Hampton, Va., for duty.

Col. Halsey Dunwoody will proceed to Washington, D. C., and report to the Assistant Secretary of War for assignment to duty in his office.

Second Lieut. John Lawson Leonard is transferred to United States Army General Hospital No. 28, Fort Sheridan, Ill., and will report to the commanding officer, that place, for further observation and treatment.

First Lieut. John D. Cox will report in person to the commanding officer Letterman General Hospital, San Francisco, Calif.

Lieut. Col. Benjamin F. Castle is detailed as assistant to the military attaché, Paris, France, and will report to the military attaché, American Embassy, Paris, for assignment to duty.

The following-named second lieutenants will proceed to Barron Field, Everman, Tex.: Henry E. Wooldridge, Paul H. Prentiss, William B. Atwell.

Col. Olan C. Aleshire will proceed to Fort Sam Houston, San Antonio, Tex., to the commanding general Southern Department for duty as assistant department Air Service officer.

First Lieut. Robert Furrer Linkenhoker will proceed to Whipple Barracks, Ariz., and report in person to the commanding officer United States Army General Hospital No. 20 for duty.

Maj. Frederic C. Phelps will proceed to Taliaferro Field, Hicks, Tex., and report by letter to the Director of Air Service.

First Lieut. William H. Preece will report in person to the commanding general Camp Lee, Va., for discharge.



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FLIGHT DIRECTOR

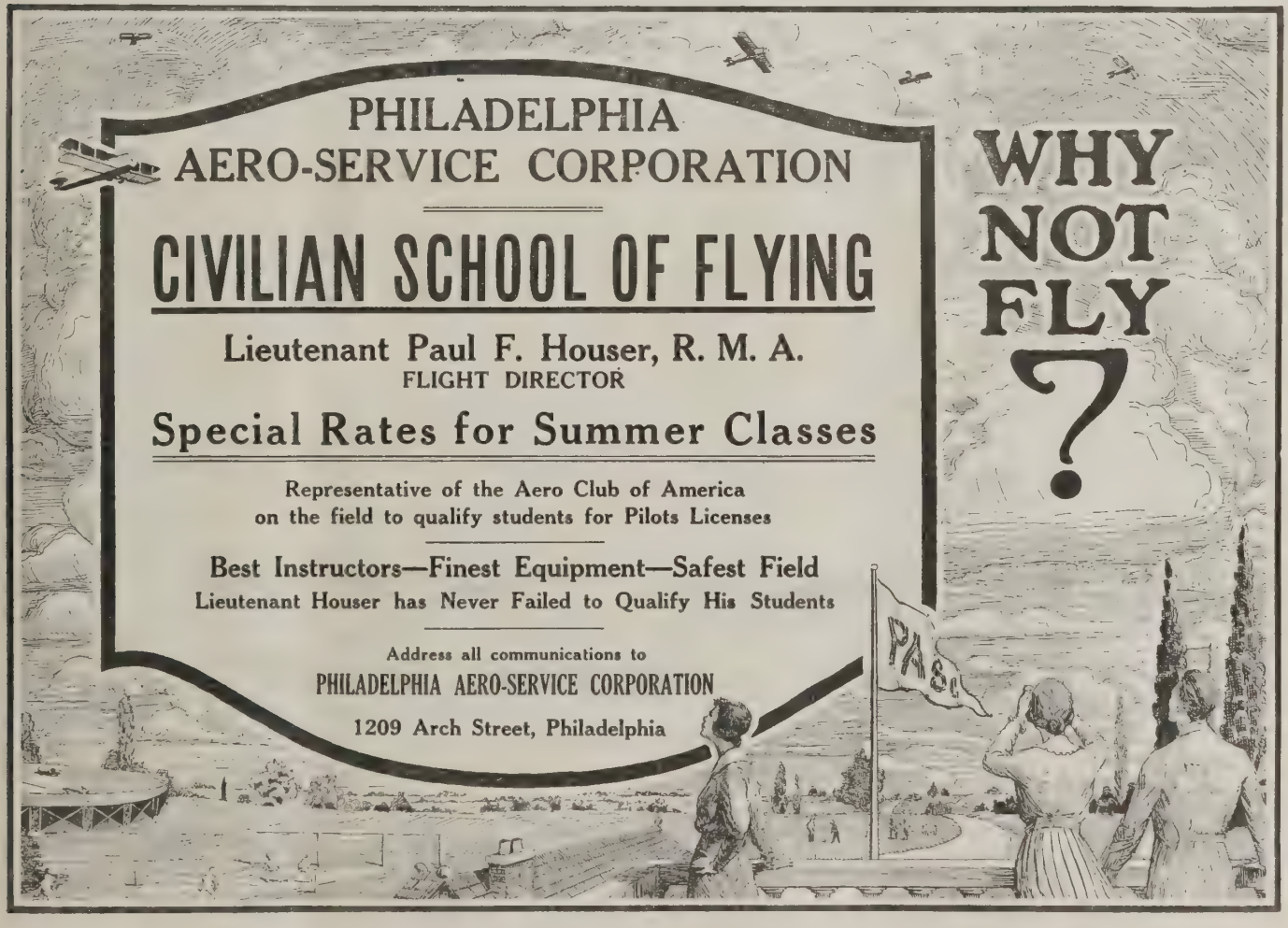
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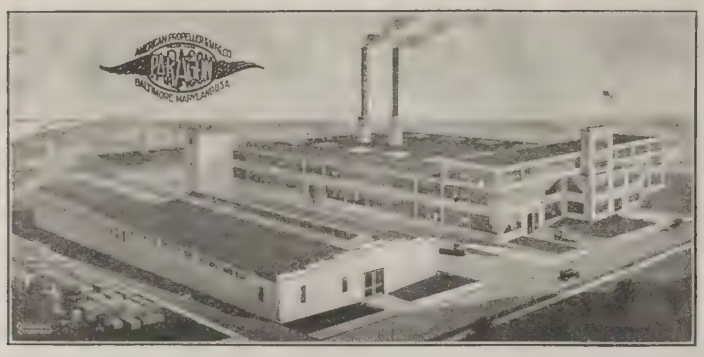
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(*Continued from page* 1021)

the duties of the several bureaus, offices, sections, or branches of the public service by this Act transferred to and made a part of the Department of Aeronautics shall, as far as the same are not in conflict with this Act, remain in full force and effect until otherwise provided by law.

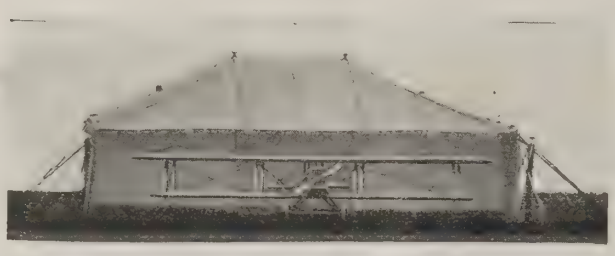
SEC. 19. That the President be, and he is hereby, authorized, by order in writing, to transfer at any time the whole or any part of any office, bureau, division, or other branch of the public service engaged in aviation work from the Department of War, Postoffice Department, or the Department of the Navy to the Department of Aeronautics, and in every such case the duties and authorities performed by and conferred by law upon such office, bureau, division, or other branch of the public service, or the part thereof which is so transferred, and all power and authority conferred by law, both supervisory or appellate upon the department from which the transfer is made, or the Secretary thereof, in relation to the said office, bureau, division, or other branch of the public service, or the part thereof so transferred, shall immediately, when such transfer is so ordered by the president, be fully conferred upon and vested in the Department of Aeronautics or the Secretary thereof, as the case may be, as to the whole or part of such office, bureau, division, or other branch of the public service so transferred.

SEC. 20. That all laws and parts of laws in so far as they are inconsistent with this Act are hereby repealed.

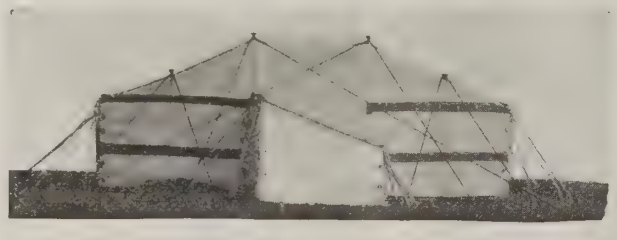
SEC. 21. That this Act shall take effect and be in force from and after its passage.

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AUG 22 1919

AERIAL AGE WEEKLY

Vol. 9, No. 23 AUGUST 18, 1919 10 CENTS A COPY



A Nieuport Climbing

Capt. Charles J. Glidden Offers Glidden Efficiency Trophy

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VOL. IX NEW YORK, AUGUST 18, 1919 NO. 23

CAPT. CHARLES J. GLIDDEN OFFERS GLIDDEN EFFICIENCY TROPHY

TO bring about the use of aeroplanes for touring and general use, Captain Charles J. Glidden, the noted sportsman, who contributed extensively to the development of automobiling by organizing the Glidden Automobile Tours, has offered a trophy for aeroplane touring through the Aerial League of America, of which Rear Admiral Peary is president.

The trophy is to be known as the Glidden Aeroplane Efficiency Trophy, and is to be competed for under the auspices of the Aerial League of America, under rules similar to the rules which governed the automobile tours for the famous Glidden Automobile Trophy.

In making the offer of the Glidden Aeroplane Efficiency Trophy, Captain Glidden wrote to Rear Admiral Peary, the president of the Aerial League of America, expressing his belief of the great future of aviation, as follows:

"My dear Admiral Peary:

"I am happy to learn that so many members of the Aerial League of America are purchasing aeroplanes for sport, pleasure and transportation.

"It is indeed most gratifying to find that manufacturers are overwhelmed with orders and cannot produce fast enough to meet the demand.

"The experience of that aeroplane manufacturer who doubled his production three months ago, but is still behind in his deliveries because the orders for aeroplanes have quadrupled in volume, only gives an idea of what is to come.

"The five hundred people who have bought aeroplanes during the past four months and the hundreds who are placing orders and clamor for deliveries are only the vanguard of an army of thousands of people who will own aeroplanes in the near future.

"More people would own aeroplanes now if they could get deliveries, and more if there were more landing fields where they can start from and land their planes.

"We need more landing fields through the country, and the Aerial League of America deserves great credit for its work in getting cities to establish fields.

"Had we flying fields at every twenty or fifty miles from New York to San Francisco, transcontinental flights would be daily occurrences, because we have the aeroplanes that can make the flights, the people interested in making the flights, and aerial travel has many advantages and attractions.

"I believe that our engineers and manufacturers are capable of producing even better aeroplanes than were produced for the war, and that these planes will be produced as soon as something is done to bring out the qualities required in aeroplanes, to be used for pleasure, transportation, and commercial purposes.

"To assist in this constructive work, and believing that aerial tours is the best and quickest way of bringing about the use of aeroplanes for general purposes, and improving the construction of aeroplanes, and cause the establishing of flying fields throughout the country, I will gladly contribute a trophy to be competed for under rules similar to the rules of the Glidden Automobile Trophy."

Captain Glidden's generous offer has been accepted by the Executive Committee of the Aerial League of America, and the rules for the Glidden Aeroplane Efficiency Trophy are being drawn by a committee of which Major Reed G. Landis, second ranking American Ace, is chairman.

Captain Charles J. Glidden, who is the publicity officer, Air Service, United States Army, is about to leave the Army, having requested discharge. He was a pioneer in the automobile field, and as the donor of the Glidden Trophy for automobiling and as a world-touring automobilist he contributed much to the development of the automobile. He was also a pioneer in aeronautics, becoming interested in ballooning twenty years ago. He holds the American, French and British balloon pilot certificates, and was one of the founders of the Aero Club of America, in 1905. He entered service at the United States Army Balloon School as an officer, June 12, 1917, at Omaha, Neb., then became department aeronautical officer, Northeastern Department, Boston, Mass., and organized the aeronautical department and secured in two months 2,000 applications for balloon pilots and aviators, and when transferred applications were coming in at the rate of forty per day. His transfer was to Omaha, Neb., where he became the president of the Aviation Examining Board. He had twelve states and secured in four months 4,000 applications for balloon pilots and aviators, personally passing on mental qualifications of over 2,000 men, to join the service. As personnel adjutant, U. S. Army Balloon School, Fort Omaha, Neb., he had the assigning of men to proper positions and for overseas, and passed on 4,000 men.

Later he was representative of the General Staff at Atlanta, Ga., for seven states to secure staff officers, and at the time the armistice was signed applications were coming in at the rate of fifty a day. He had secured 250 in ten days. He was transferred to the Souther Field, Ga., for administrative work, and at one time held fifteen positions, including personnel adjutant and publicity officer.

In April, 1919, he was placed in charge of the recruiting campaign for the Air Service, and in a short time secured the names of 17,000 persons interested in aviation who were assisting in obtaining recruits.

He was transferred to Washington and started the Air Service publicity, and issued stencils daily showing activities of the Air Service, as news all over the United States, showing many exceedingly interesting events unknown, such as forest fire patrol, cross-country flying, etc., etc., etc. From May 14 to August 8, 1919, he issued 115 stencils containing nearly 2,000 items of Air Service activities.

In conference with Chief of U. S. Weather Bureau and forecasters he arranged for the adoption by them of a weather forecast for navigators of the air, which is sent to all Air Service stations at 9.30 A.M. and 9.30 P.M. daily, governing their flights as far as weather is concerned, thereby saving loss of life and property and considered one of the most valuable features of the Air Service.

REPORT OF THE AMERICAN AVIATION MISSION ON EUROPEAN TOUR

THE War Department authorizes publication of the following statement by the Secretary of War and of the appended report of the American Aviation Mission of which the Assistant Secretary of War, Benedict Crowell, was chairman:

"In making public the report submitted to me by Mr. Crowell and his associates on the American Aviation Mission, I desire to emphasize the thoroughness and value of the studies made in England, France and Italy with regard to the importance of aircraft and the essential dependence of the art for its development upon a sympathetic attitude in the Government. Those best informed throughout the world are in accord in believing that this new agency of transportation has possibilities upon which it is now quite impossible to set limits. They are further agreed that we face a period, more or less brief, in which the prospect of commercial return is not sufficiently sure to justify private enterprise in developing the aeroplane industry into a self-sustaining position.

"The importance of aircraft as a military arm is obviously so great that we must leave nothing undone both to develop the art in its scientific and practical aspects and to provide facilities for rapid quantity production in the event of emergency.

"From these considerations it is clear that the ingenuity and ability of American engineers and inventors must be coordinated and our national effort freed from wastefulness and duplication.

"The Mission has in my judgment gone too far in suggesting a single centralized air service. Army and Navy aviators are specialists in the art, both the aeroplanes and the pilots needed, are of a different type from those needed in civil undertakings. The pilots particularly need to be trained upon a different theory. Military pilots are trained to fight singly or in formation, and to operate in coordination with other branches of the military service, so that their training must be military. Their own efficiency and that of the other branches of the service depends upon the most intense and constant associated training, and a separation of the Air Service from the Army or the Navy would require coordination of their activities in time of war, whereas effectiveness in military operation rests upon the concentration and singleness of authority, command, and purpose.

"The point emphasized by the Mission is the importance of maintaining adequate production facilities in this country. This it is believed can be brought about best by the establishment of a government agency which will lay down the necessary rules, national and international, for aircraft operation, prevent discouraging lack of uniformity in state regulation, and generally stimulate private and public enterprise in perfecting and using commercially this mode of transportation, and by centralizing the placing of orders on government account so as to have the incidental effect of making them contribute to the maintenance of aircraft production as an industry. It is not proposed, as I understand it, that great appropriations of public funds should be made for the establishment of uneconomic commercial air service routes, but obviously an extension of our air mail service could be made, and it could be further extended as the perfection of machines advances and their reliability of service is more and more established. Such encouragement as the government may find it wise to give can be accomplished without sacrificing the science of military aeronautics. The Joint Board of the Army and Navy is already eliminating duplication and producing cooperation in developing the air service of those departments, and should Congress decide to extend its aid to the commercial development of aircraft, complete cooperation will be easy in all matters of invention, design, and production where the different aspects of the problem meet on a common ground.

"(Signed) NEWTON D. BAKER,
"Secretary of War."

The full report is as follows:

To the Secretary of War.

In accordance with your instructions, the American Aviation Mission visited France, Italy and England. It was able to confer with various ministers of these Governments, ranking Army and Navy commanders, and the foremost aircraft manufacturers.

A thorough study and investigation was made by your Mission of all forms of organization, production and development. As a result of these studies, your Mission desires to emphasize the universal opinion of its members that immediate action is necessary to safeguard the air interests of the United States, to preserve for the Government some benefit of the great aviation expenditures made during the period of the war, and to prevent a vitally necessary industry from entirely disappearing. Ninety per cent of the industry created during the war has been liquidated. Unless some definite policy is adopted by the Government, it is inevitable that the remaining 10 per cent will also disappear.

In placing this matter before you the subject falls into three important heads:

(1) General organization.
(2) Development, commercial.
(3) Development, technical.

The findings of the American Aviation Mission and its recommendations are submitted after a careful review of the situation in the allied countries mentioned, but always keeping in mind the situation in the United States. Under the above sub-heads the results of those investigations are presented to you, which, in the opinion of the Mission, demand the most earnest and immediate consideration along the broadest lines, with a view to establishing some fixed policy which will save the aircraft situation in the United States and give the United States an equal place with the great powers of Europe in this great new commercial development.

The American Aviation Mission therefore recommends: The concentration of the air activities of the United States, military, naval and civilian, within the direction of a single Government agency created for the purpose, co-equal in importance with the departments of War, Navy and of Commerce, to be called in this report, for purposes of identification, the National Air Service.

In making the above recommendations, the following views and data of the Mission are presented:

Visits were made by the Mission to England, France, Italy, and conferences have been held with those largely responsible for the successful prosecution of the war, and especially with those men most experienced in the aerial development within those countries. Among others interviews have been had with:

France:

Marechal Foch, Commander-in-Chief des Armees Alliees.
Mr. Andre Tardieu, Ministre de Affaires Franco Americaines.
General M. Duval, Chef de Service de l'Aeronautique.
Mr. Jacques Dumesnil, Depute, formerly Sous-Secretaire de l'Aeronautique.
Mr. Loucheur, President du Conseil de Guerro, now Minister of Reconstruction.
Mr. Daniel Vincent, Depute, ex-Under Secretaire for Aviation.
Mr. Gaston Menior, Depute, Chief du Comite Aeronautique au Senat.
Major d'Aiguillon, of the Commission Interministerielle de l'Aviation Civile.

England:

Honorable Winston Churchill, M.P., Secretary of State for War and Air.
Field Marshal Sir Douglas Haig, Commander-in-Chief of the British Army.
Admiral Sir David Beatty, R.N., Admiral of the Fleet.
Major General Right Hon. J. E. B. Seely, Under Secretary of State for Air.
Major General Hugh M. Trenchard, Chief of Air Staff, Royal Air Force.
Major General E. L. Ellington, Director General, Supply and Research, Royal Air Force.
Major General Sir Frederick H. Sykes, Controller General Civil Aviation, Royal Air Force.
Sir W. A. Robinson, Secretary, Air Ministry.
Major General Sir W. S. Brancker, Royal Air Force.

Italy:

Signor G. Grassi, Chief of the Italian Aviation Mission in Paris.
Colonel Guidoni, Italian Foreign Aeronautical Mission.
Admiral Orsini, Chief of Italian Naval Aviation.
Colonel Crocco, Chief of the Technical Bureau.
Signor Conti, Secretary of State for Aviation.

In all countries visited, and in the minds of all persons met

(*Continued on page* 1063)



THE NEWS OF THE WEEK



75-Minute Flight Between Washington and New York

Washington, D. C.—The air speed record between Washington and New York was broken on August 8 by a De Haviland plane, piloted by Lieut. Col. H. B. Claggett, commander of the Dallas-Boston fliers, who covered the distance of 210 miles from the Capitol at Washington to the Statue of Liberty in 75 minutes. This was an average speed rate of 168 miles an hour. Sergeant Ralph Kratz was a passenger in the plane. The elevation during flight average 4,000 feet.

NC-4's Trip Postponed

Portland, Me.—The exhibition trip along the coast from Portland to Galveston, Tex., of the NC-4, the first plane to make the flight across the Atlantic, has been postponed one month. The plane is now expected to arrive here on October 1.

Aero Club of America Honors Admiral Fiske, Inventor of Torpedo Plane

The Board of Governors of the Aero Club of America announced on August 9 that they had awarded the gold medal of the club to Rear Admiral Bradley A. Fiske, U. S. N., retired, for his invention of the torpedo plane, patented on July 16, 1912, which was used effectively during the war. Announcement was also made of the receipt of the following letter from Rear Admiral Fiske:

"I hasten to express my gratitude to the Aero Club of America for the award of its gold medal and to thank you for your kind letter of presentation.

"To be awarded a gold medal is an honor that any one should appreciate profoundly. To be awarded the gold medal of the Aero Club of America is an honor that is exceptional, because the standing of the Aero Club is exceptional, but though the standing of the Aero Club is very high, the effective work which it carried on throughout the war is not fully appreciated by the nation for the reason that its work was unofficial, and therefore not recognized officially.

"Like many another unrecognized agency, however, its influence was potent and profound. Acting as the advance scout of aeronautic progress, the Aero Club continually gave information to the country of the possibilities of naval and military aeronautics, insisted that those possibilities be utilized, and demanded that Congress appropriate such sums of money as would enable the Government Departments to utilize those possibilities completely and in time.

"Enormous appropriations were then made, but as Congress delayed making them until after we had actually entered the war, the appropriations came too late to permit American aeronautics to do as much effective work as it otherwise could in winning it.

"Your letter gives me more credit than I deserve for furthering the cause of naval and military aeronautics. What little I was able to accomplish should be credited to the Aero Club of America and to the press of the United States, which supported the club's efforts with such keen patriotism and intelligence."



Eddie Stinson's youngest passenger still in smiles at end of 75 mile cross country flight

Committee Going on Month Trip in Aircraft Inquiry

Announcement was made August 10 that the Subcommittee on Aviation of the House Committee on War Expenditures will begin at once a month's inquiry of charges reflecting on John D. Ryan, formerly head of the Aircraft Production Board. Representative Frear, Republican, of Wisconsin, chairman of the subcommittee, issued a statement of the programme, which is to include an inquiry into the sale of surplus linen, contracts for the production of castor beans for oil for Liberty motors, and various other aviation matters.

A portion of Mr. Frear's statement is devoted to criticism of Homer S. Cummings, chairman of the Democratic National Committee, because Democratic publicity recently referred to the proposed trip as a junket. Mr. Frear said this attack justified a statement as to the purposes of the inquiry to be made by him and his colleagues on the subcommittee, who are Representatives Magee, Republican, of New York, and Lea, Democrat, of California.

"Protests from responsible persons on the Pacific coast have been placed before our committee against a proposed sale of railway properties, mills, timber and the like on September 2, which have cost the Government presumably $20,000,000 and more, all of which are involved in the charges. A letter from Senator Jones, of Washington, to President Wilson strongly urging an 'honest to God' investigation was submitted to the committee.

"A remarkable situation developed when we discovered that contracts, vouchers and data covering nearly $50,000,000 of spruce production expenditures were kept at Portland, Ore., and none filed here. The committee is called upon to find out what was done with money spent for spruce production and for logging roads costing more than $100,000 a mile, useful for the Milwaukee and St. Paul Railroad alone."

Lands in 5,000-Foot Canyon in Yosemite Park

Mather Field, Sacramento, Cal.—Lieut. Earl E. Neubig, from this field, completed one of the most difficult flights ever undertaken, from Sacramento, Cal., into Yosemite National Park, the floor of which is 4,000 feet high. In order to make a landing in the park it was necessary for Lieut. Neubig to gain an altitude of 11,000 feet and spiral down between the walls of the canyon, which are 5,000 feet high and one-quarter of a mile wide. He landed on the field, which was very difficult to reach owing to the high trees and wires surrounding it, and his plane stopped rolling just about 10 feet in front of a multitude of park visitors who were there to greet him.

The trip was made in a Curtiss H biplane powered by a Hispano-Suiza engine. The time between Sacramento to San Francisco, 90 miles in 90 minutes; San Francisco to Yosemite, 180 miles in 100 minutes; Yosemite to Sacramento, 90 miles in 90 minutes.



One of the new biplanes used by the New York Police Department, piloted by Captain Bruce Eytinge of the Aerial Police Reserve

45,000 Miles in Forest Fire Patrol

During the six weeks ending August 2, 56 fires have been discovered in the California forests by the aerial forest fire patrol, reported promptly, and quickly extinguished, causing only nominal damage.

The corps of aviators from the three flying stations, Mather Field, Sacramento; March Field, Alessandro, and Rockwell Field, San Diego. have made 373 flights over the forest, a distance of 45,376 miles, in 38,545 minutes. To this can be added the wonderful work of the U. S. Army Balloon School at Arcadia, who have maintained in the air night and day an observation balloon similar to that used on the western front, from which observation has been made personally by the commanding officer of the post and other high officials, including the entire staff, that the service may be maintained at a high point of efficiency. Many fires discovered have been quickly extinguished and no serious damage reported.

Eddie Stinson Carries Young and Old

York, Pa.—"Eddie" Stinson, the famous exhibition flier, has carried the youngest and oldest passengers who have been up in an aeroplane in America, the youngest being Miss Mitzi May Kuntz, aged eight months, and the oldest a woman of eighty-seven. Mr. William J. Kuntz arranged with Mr. Stinson for a cross-country flight, and it was decided to take his baby daughter with him. Starting from York, they flew due north over the Susquehanna River to Goldsboro; then southeast to Cly; then southwest back to York, a total distance of seventy-five miles. The young passenger was smiling and happy after her aerial joy ride.

Pacific Fleet Photographed 150 Miles At Sea

San Diego, Cal.—Taking with him two newspaper photographers, Captain Lowell H. Smith, who holds the record for flight between San Francisco and San Diego, flew 150 miles out to sea in order to obtain photographs of the new Pacific Fleet. On the following day the photographs were delivered to San Francisco by aeroplane.

Venice, California, Opens Aviation Field

Venice, Cal.—An aviation landing field was opened here on August 5. A group of Air Service officers and men from Ross Field participated in the ceremonies. Three ascensions of a 37,500 cubic foot Cacquot captive balloon, each with a parachute jump, were made. The gas from the Cacquot was then deflated into a spherical balloon and three flights were made, one a night flight of two hours over a distance of twenty miles, and two on the morning following.

Curtiss Oriole Makes First Flight Over Pike's Peak

Colorado Springs, Colo.—Lieut. Alex Lendrum of Colorado Springs, in a Curtiss Oriole biplane, circled the summit of Pike's Peak on August 3, reaching an altitude of 14,200 feet. He was accompanied by Ira J. Humphries of Denver and L. L. Law Sipple, a photographer, who filmed scenes of the summit and of the Pikes Peak region. The flight was the first ever made to the crest of the mountain.

Reno to Sacramento in 65 Minutes

Pilot Lieut. W. C. Goldsborough, with passenger, Lieut. J. Parker Vanzandam, in a DeHaviland, on August 2 flew from Mather Field, Sacramento, Cal., to Reno, Nev., 130 miles, in 85 minutes. Maximum altitude was attained over Lake Tahoe of 13,000 feet, and forced landing made at Minden, Nev., in 65 minutes flying time to Minden from Sacramento, against 13 hours by train.

National Geographic Society Predicts Around-the-World Flight

Washington, D. C.—"Now that the Atlantic has been crossed and there are plans afoot to fly over the Pacific, the day may not be far distant when some aerial Magellan will make an aeroplane tour around the world," says a bulletin of the National Geographic Society.

"There are still many corners of the world where aeroplane, automobile and even the horse would be curiosities. And if a man set out to tour the globe and 'do as the Romans do' in respect to adopting native conveyances he would have to:

"Resort to a donkey in Spanish America and in the Holy Land,

"Climb aboard a camel to traverse African deserts,

"Cross some rivers of India on the inflated skins of bullocks, and others by a bridge of one rawhide rope,

"Submit to the sea-going motion of an elephant when he continued his journey on land,

"Get into a man-borne palanquin at Calcutta,

"Jolt over Far Eastern roads in a non-shock absorbing cart drawn by oxen,

"And in China be prepared to climb into a jinrikisha, a sedan chair or a wheelbarrow."

The bulletin continues with a series of picturesque illustrations contrasting aerial transport with systems still in vogue.

Forest Patrol for Oregon Being Organized

Salem, Ore.—Major A. Smith, officer-in-charge of the new aerial forest patrol squadron, which will operate in this vicinity in the near future, arrived here on August 8 from Medford, piloting a Curtiss H biplane. The distance of 210 miles was covered in 160 minutes.

Iowa Doctor Buys Aeroplane

Fort Dodge, Iowa.—Dr. F. C. Stahlee has purchased an aeroplane in order to enable him to make professional calls over the large expanse which his practice covers.

Aero Club of Pennsylvania Merge With Aviators' Club of Pennsylvania

Philadelphia, Pa.—The Aviators' Club of Pennsylvania, all of whose active members are fliers, has merged its activities with the Aero Club of Pennsylvania, through its president, Joseph A. Steinmetz. By this arrangement the new organization receives the membership, funds, club rooms and books located at the clubhouse of the Engineers' Club.

The active officers elected, all of whom are fliers, are: Captain Claude R. Collins, New York City Air Police, president; George S. Ireland, agent Curtiss Eastern Airplane Co., and Brooke Edwards, former army flier, vice-presidents; Charles W. Carvin, night flying instructor, secretary; Floyd Showalter, manager Essington School of Aviation, treasurer. Directors: John Bell Huhn, Murray Earle, George R. Brown, D. Willard Zahn and Sewall Cathcart. Mr. Richard J. Beamish, aircraft production expert, was made an honorary life member.

The club will be divided into two classes, fliers and non-fliers. Only fliers will be entitled to vote.

The club is pushing the establishment of a municipal aerodrome. It is hoped to obtain through legislation a piece of land about a mile square on the banks of the Delaware River as near to the center of the city as possible for an aerodrome.

Space around the edges of the field will be cleared, hangars built and leased to commercial enterprises at prices placed as low as possible. An aerial garage, machine shop, dope shop, service station and supply store will be conducted in conjunction, with skilled mechanics always at hand. The clubhouse will be placed at the disposal of the firms using the facilities of the field and no interference with any enterprise will be offered by the club. This will furnish commercial enterprises with the best possible landing field at a low cost, mechanics and repair service, and supplies without waiting.



A million dollars' worth of American aeroplanes stacked at Colombey-les-Belles, in France—not brought down by some giant tornado, but scrapped under orders which Congress is investigating © Underwood

The AIRCRAFT TRADE REVIEW

Buffalo Plant of Curtiss Company Increasing Output

Buffalo, N. Y.—The local plant of the Curtiss Aeroplane and Motor Company is said to be planning operations on a monthly schedule calling for 225 aeroplanes and 200 motors.

Glenn Martin Completes Passenger Carrier for Government

The Glenn L. Martin Company is completing the construction of a ten-passenger biplane on government order. It is expected that this type will be manufactured for commercial transport.

New York-Washington Aeroplane Passenger Service Planned

Washington, D. C.—According to a communication from the National Air Service Company, a regular passenger-carrying service between Washington and New York is to be inaugurated as soon as safe landing fields are established. It may be possible to obtain permission to use Bolling Field.

A service between New York and Boston is also contemplated and the chambers of commerce of both cities have been asked for information as to landing fields. The National Air Service Company is ready to start operations as soon as landing arrangements are completed, it is stated.

Aeroplane Mechanics School Starts in Spokane

Spokane, Wash.—The Modern Auto and Tractor School of this city is starting an aeroplane mechanics' school, as a result of the local interest in aeronautics. Sixteen thousand dollars' worth of equipment has been purchased. C. H. Messer, vice-president of the school, is in Detroit purchasing a Curtiss biplane and accessories. A pilot will be employed from among the local discharged men.

Five Courses Offered by Academy of Applied Aeronautics

Chicago, Ill.——The regular courses of the Academy of Applied Aeronautics which are being offered in addition to the two months' summer school course announced in our July 14 issue, are as follows:

Elementary Aeronautics: Three evenings per week for ten weeks. Elements of aerodynamic theory; calculations; principles of aeronautical motors; laboratory and wind tunnel experiments.

Aeronautical Engineering Course leading to degree of aeronautical engineer for college and technical graduates. An advanced engineering course.

Aeroplane Mechanics' Course, preperation for a position in commercial aeronautics. Theory, repair and inspection of aeroplane motors; principles of flight, rigging, tuning, repairing and inspection; housing and shipping of planes.

Post Graduate Course in Flying for graduates desiring flying experience. After qualifying for Aeronautical Engineering or Aeroplane Mechanics' Course.

Pilots' and Navigators' Course. A course leading to a pilot's license and a comprehensive knowledge of the science of aeronautics.

The school is conducted in a four-story fireproof structure with large and light classrooms, laboratories and rest rooms, conveniently located on the shore of Lake Michigan with direct transportation connections to all parts of Chicago.

Aerial Sightseeing Service Over Washington

Washington, D. C.—A group of ex-army aviators have organized an aerial sightseeing service over the city of Washington. A sixteen-mile flight from a field at Arlington in a Curtiss biplane will be regularly made for passengers every week day afternoon and all day Sunday.

The service is to be conducted by aviators recently released from the service, among them being W. W. Major, manager of the postal aviation field at College Park; Leon D. Smith, former pilot for the air mail service; Neal Angle, expert rigger from the College Park field, and D. S. Collier, of the air mail service.

RETRACTABLE LANDING CHASSIS PATENT GRANTED TO JAMES V. MARTIN

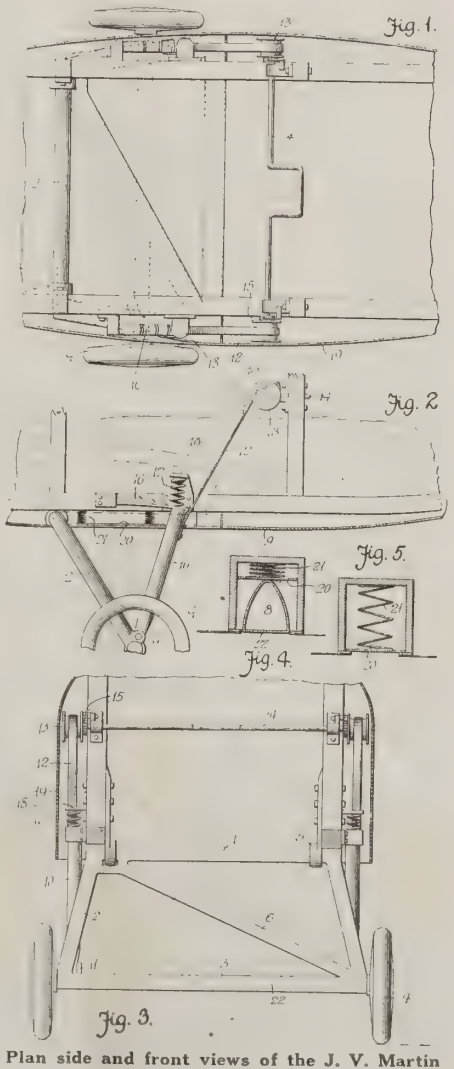
UNDER date of June 17, 1919, patent has been granted James V. Martin for an aircraft running and alighting device known as the retractable chassis. This invention relates to a landing gear which is arranged to be drawn up to the body of the aeroplane while it is in flight, thereby materially reducing head resistance. The device takes care of the absorption of running jars and alighting shocks. The construction also provides means for completely housing the device when the machine is in flight and when extended of closing the housings in such a manner as to present minimum wind resistance and not disturb the passage of air along the streamline of the fuselage when the recesses are not occupied by the alighting device.

The accompanying patent office drawings show some of the claims covered by Mr. Martin's patent. As shown in these drawings, a swinging frame is formed having a journal member (1) rigidly associated with end members (2) and outer members (3) to carry wheels (4) of any approved type. Bearing brackets (5) connected to the struts and longerons of the fuselage framework pivotally support the member (1), rigidity to the chassis frame as a whole being given by a single diagonal brace (6) which may be proportioned as shown, the parts 2, 3 and 6 of the chassis frame preferably having the cross sectional contour indicated in Figure 4 as the housed portion (8). The bearings (5) are so situated that the member (1) is at all times above the plane of the lower skin or sheathing (9) of the fuselage, and consequently is entirely out of the path of the air current.

Struts (10) are each journaled or pivoted, as at (11), to the frame members (2), adjacent to the wheel bearings and are held in upright position when the chasis is restracted, by flexible connections (12) passing over suitable drums (13) on a crankshaft (14) operable from the fuselage, a ratchet mechanism (15) holding the same at any point desired. When the device is lowered, the upper end portions of the struts (10) are snapped under spring members (16) of the leaf type, further shock absorbing means being had if desired in the form of upright spiral springs (17) in compression between the leaf springs (16) and a bracket member (18). The release of the ratchet mechanism (15) permits the momentary lowering of the struts (10) until they are clear of and fall to rearward of the latches, both because of gravity and because of the action of the wind in causing them to swing back.

The flexible connections (12) with their

(*Continued on page* 1065)



Plan side and front views of the J. V. Martin retractable chassis

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Lewis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative

US AERIAL MAIL

PILOTS

Dana C. DeHart
Edward V. Gardner
Eber H. Lee
John M. Miller
Leon D. Smith
Max Miller
Charles E. Bradley
Lester F. Bishop
Harold T. Lewis
Leslie E. Stancill
Charles Hugh Anglin
John H. Skoning
Earl F. White
Charles W. Lamborn
Frank H. Crozier
Walter H. Stevens

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

Aerial Mail Trip Between San Francisco and Sacramento

San Francisco, Cal.—Inaugurating the first aerial mail service on the western coast, Lieutenant C. C. Nutt, carrying Fanchon Wolft, a well-known San Francisco dancer as passenger in his De Haviland, flew from San Francisco to Sacramento in 45 minutes on July 31. The return was made in one hour. Two other De Havilands, piloted by Lieutenants E. H. Nelson and E. W. Killgore, accompanied the mail plane. The aviators are the members of the Ellington Field Squadron. The flight was conducted under the auspices of the San Francisco *Bulletin*.

Aerial Mail Service Between Canada and United States

The Aero Club of Canada has taken up with the Canadian Postoffice Department the matter of delivering mail between Toronto and Buffalo, Syracuse, Albany and New York during the international race for the Commodore prize of $10,000.

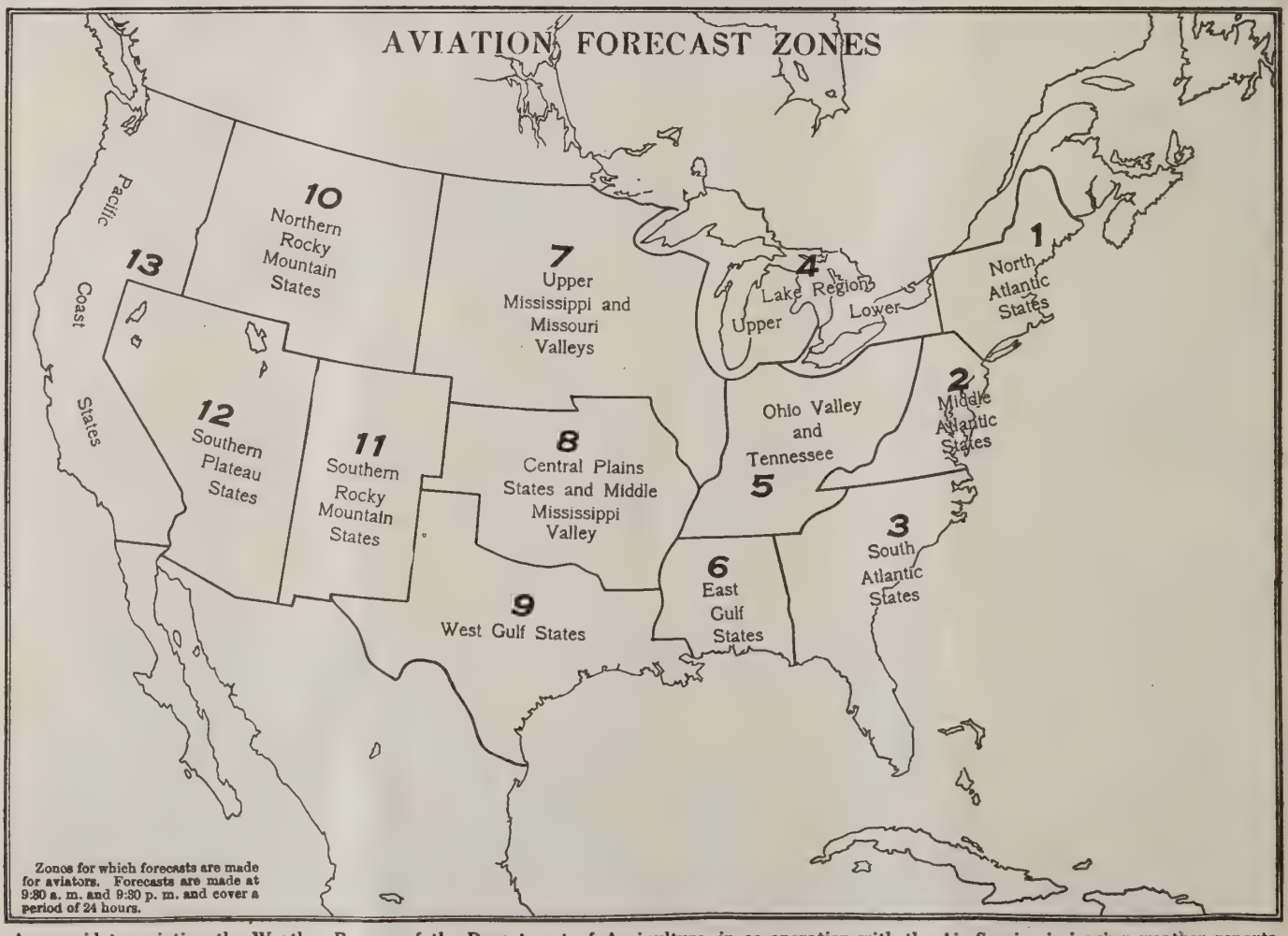
The establishment of an aerial mail service between the two countries is looked forward to with great enthusiasm by business men and has the endorsement of the chambers of comerce and civic organizations of Toronto, Hamilton, Welland, Albany, Syracuse and Buffalo.

Aerial Weather Forecast Service Improved

Washington, D. C.—The weather bureau of the Department of Agriculture has prepared a map of the United States, divided into thirteen zones, for which forecasts are to be made for aviators and balloon pilots. These forecasts are made twice daily, at 9:30 A. M. and 9:30 P. M., and cover conditions for the succeeding twenty-four hours.

Since July 21, forecasts have been made with the country divided into seven zones, with such satisfactory results that the number of zones has been increased to thirteen.

The Air Service has sent out the revised map to their active stations throughout the country and the forecast will be forwarded at the time made, it being intended that all cross-country fliers shall be advised of the weather conditions before starting on any contemplated flight, thereby reducing, as much as possible, to a minimum the liability of injury to aviators, balloon pilots, passengers and property, as far as weather conditions are concerned.



As an aid to aviation the Weather Bureau of the Department of Agriculture, in co-operation with the Air Service is issuing weather reports on meteorological conditions twice daily, which are available for civilian aviators. Map was prepared by Captain Charles J. Glidden, pioneer automobilist and aeronaut, who has just offered the Glidden Aeroplane Efficiency Trophy

THE BRISTOL AEROPLANES

AS one of the pioneer firms in the aircraft industry particular interest attaches to the products of the British & Colonial Aeroplane Co., Ltd., of Filton, Bristol, who commenced their career quite in the earliest days with "box kites" of the Farman type, later followed by more original designs by, in succession, Prier, Gordon England, and Coanda. It was, however, to neither of these designers that the honor of designing the "Bristol" war machines fell. This responsibility rested upon Captain F. S. Barnwell, R. A. F., who joined the firm as designer before the war, and produced, in collaboration, we believe, with Mr. Busteed, the little Bristol scout of pre-war days. The first of these machines was exhibited at the Olympia Aero Show of 1914. Later in the year a similar machine was flown by Lord Carberry in the London-Paris-London race. The first Bristol scout was not greatly different from the type D scout illustrated herewith, although there are certain variations as regards dimensions, etc.



Above—The Bristol Scout, Type F, with an air-cooled "Mercury" radial engine

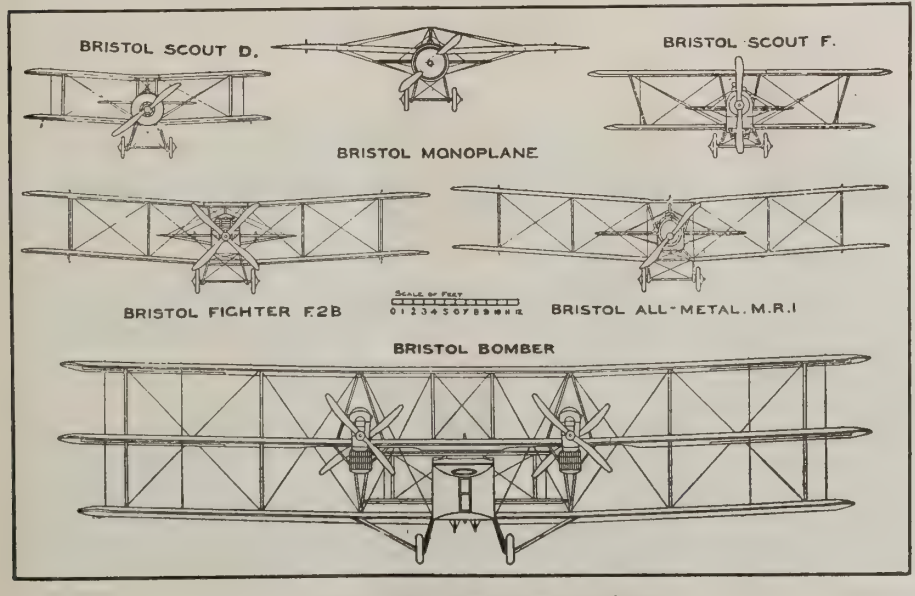
Below—The Bristol 170 h.p. Hispano engined all metal biplane

The Bristol Scout, Type D

The original Bristol scout had an area of only 156 sq. ft., whereas the type D shown in the accompanying illustrations has a total wing area of 200 sq. ft. In general outline the type D is very similar to the original Bristol scout, the rudder, tail plane and fins, as well as the body and main planes, being of almost identical shape. The body is somewhat deeper in front, and the cowling is slightly different, but otherwise the machine remains true to its prototype. Unlike several other makes of single-seater tractors, the Bristol has its wing bracing wires arranged in the plane of the staggered struts, a feature that has been considered undesirable on account of the extra drag stress it may impose on the internal bracing of the top plane, but in the case of the Bristol any such tendency is countered by fitting external drag wires running from the upper and lower ends of the rear interplane struts to the front of the fuselage. That this form of bracing is adequate would appear to be proved by the fact that to the best of our knowledge no Bristol scout has ever shed its wings in the air. Several variations of the Bristol type D have been built. With the exception of the fitting of different engines and minor alterations, they have not, however, been greatly different from the machine illustrated. To mention only one, there was the 100 h.p. Clerget-engined machine, which had a slightly different cowl, and had a rotating "spinner" fitted over the propeller boss.

The Bristol Scout, Type F

The development of the type D scout takes the form of a single-seater tractor, designed for a much more powerful engine than was the type D. In connection with the type F it should be pointed out that whereas the general arrangement drawings and the particulars in the two tables refer to a machine fitted with a 200 h.p. Sunbeam "Arab" engine, the machine sometimes has a slightly different arrangement, in which the nose of the machine is of different shape, owing to the fact that the engine is a radial air cooled, the Cosmos Mercury engine. In addition to the fact that it is fitted with a different engine, the type F Bristol scout shows variations in nearly all its other compoment parts, having, in fact, practically no resemblance to the original Bristol scout. Thus it will be seen that the type F has its lower plane of smaller chord and span than the top plane. The wing tips also are of different shape, while the various tail members are totally different in shape. Owing to the deeper nose and, generally speaking, greater side area in front, a fixed vertical fin is fitted in front of the rudder. The wing bracing is characterized by centre section and interplane struts of N formation, and the dihedral angle has disappeared. An examination of the accompanying table of performance, etc., is instructive. It will be seen that while the type D had a wing loading of 6.25 lbs. per sq. ft. and a loading of 14.7 lbs. per h.p., the corresponding figures for the type F are 8.08 and 10, respectively. The speed near the ground is 100 m.p.h. and 138 m.p.h., respectively, while the climb to 10,000 ft, occupies 18.5 mins. in the case of type D, and only 8.5 mins. for the type F. It is thus seen that it would appear that "performance" is far more a question of load per h.p. than it is one of wing loading, and that it is in fact only the question of a reasonably low landing speed which prevents one from employing a much higher wing loading than is generally found.



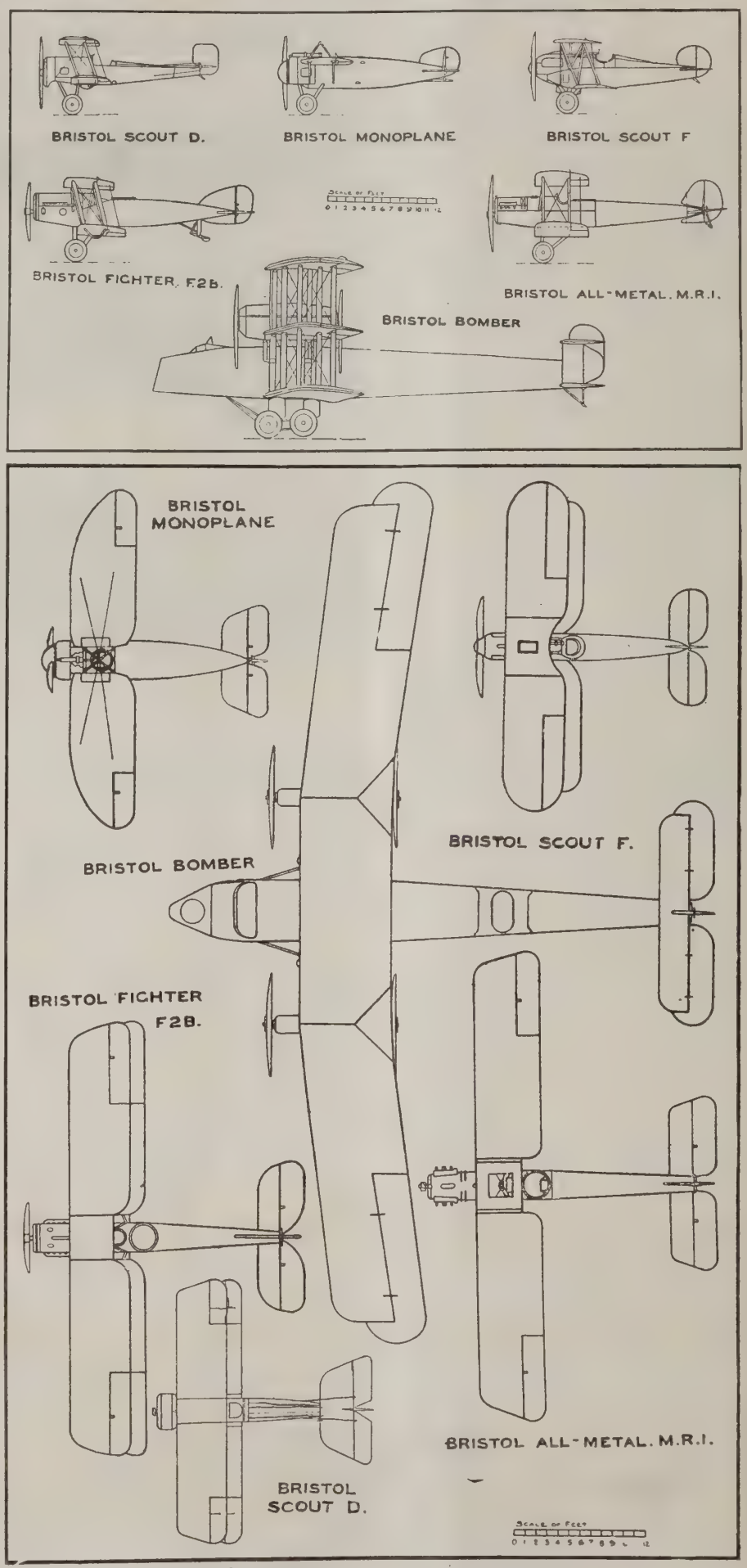
Front views of the Bristol aeroplanes

The Bristol Monoplane

With the exception of the very earliest days of the war, there has been, at any rate in Great Britain, a remarkable absence of aeroplanes of the monoplane type. Some of the first machines to go out were, it is true, of this type, as for instance the Bleriots and Moranes, but before many months of war had passed the biplanes were rapidly supplanting the monoplanes, and during the last two years of war the monoplane was hardly if ever seen. This may appear somewhat strange, especially as the monoplane has undoubted advantages for fighting purposes, giving as it does a much better view forward and upward. Especially is this true of the "parasol" type of monoplane in which the wings are on a level with the eyes of the pilot, but for some reason or other the type has not found general favor. Special interest, therefore, attaches to such few monoplanes as have been built during the war, among which is the Bristol monoplane. This machine, it will be seen from the accompanying illustrations, is of very pleasing appearance, with its stream-line body and crescent-shaped wings. Efficiency is the keynote of its design, with head resistance reduced to a minimum. Thus the wing section employed is such as to allow of very deep wing spars which are capable of taking care of their load with a minimum of external aid, in the shape of one wire to each spar. Lateral control is not by means of wing warping, as was the general practice in monoplanes before the war, but by ailerons as in the biplanes. This form of lateral control is probably chosen in view of the deep wing section, which would tend to make a comparatively rigid wing structure difficult to warp and liable to excessive strain if warping were employed. In order to give the pilot a better view downwards—forward and upward is already as good as it is possible to make it—openings are provided in the inner portion of the wings, near the sides of the fuselage, and one is inclined to think that in this respect at least the Bristol monoplane is able to hold its own against any conceivable biplane combination. As regards performance: from the table it will be seen that near the ground the monoplane is capable of a speed of 130 m.p.h., which is distinctly good for an engine of only 110 h.p. At 10,000 ft. this speed has dropped to 117 m.p.h., which is not bad considering that the engine is a rotary. The climb also is quite good, the first 5,000 ft. only taking 3½ mins., while 10,000 ft. is reached in 9 mins. As the landing speed is certainly not unduly high, it appears that taking it all round, the monoplane is able to hold its own against the biplane for performance, and there can be no doubt that as regards visibility the monoplane has it all its own way. For peaceful purposes we are not at all certain that the last has been heard of the monoplane type of machine.

The Bristol Fighter

Probably the best known of the Bristol products during the war is the Fighter (F2B). This machine has been extensively used for fighting, reconnaissance, etc. The impression one receives on examinating the F2B is that it was designed in the first instance for the purpose for which it was intended, and not merely designed from the aero-dynamical point of view and afterwards rigged up for certain purposes for which machines happened to be required. There is a decided



Plan and side views of the Bristol aeroplanes

difference between the two methods. Thus it will be observed that the designer quite evidently had in his mind to provide as free a field aft as possible, and to this end he chose to flatten the fuselage out to a horizontal knife edge, bringing the various tail members down lower out of the way of the gun. Also the flat top of the body bears evidence of this intention. Again, it was desired to place the gunner and pilot high in relation to the top plane, and to do this would have meant, with the ordinary arrangement, a very deep body with consequent large maximum cross-sectional area. To avoid this the lower plane is not attached to the body, but runs right underneath and some distance below the bottom of the fuselage. This arrangement has resulted in a somewhat more complicated undercarriage attachment, but, everything considered, there is little doubt that it has been worth while.

From the table it will be seen that the performance of the F2B with Rolls-Royce "Falcon" engine is very good indeed. A feature of this machine which will not be found in the table and which cannot be put in table form owing to the absence of any standard of comparison is the excellent stability of this machine. We are informed by pilots that although she is not in the least sluggish on the controls the Bristol Fighter is endowed with a remarkable amount of inherent stability, which renders her particularly easy to fly. It would, therefore, appear that Captain Barnwell has managed to find the solution to the problem of good stability combined with ease of control, a fact which should be extremely valuable for post-war aeroplanes.



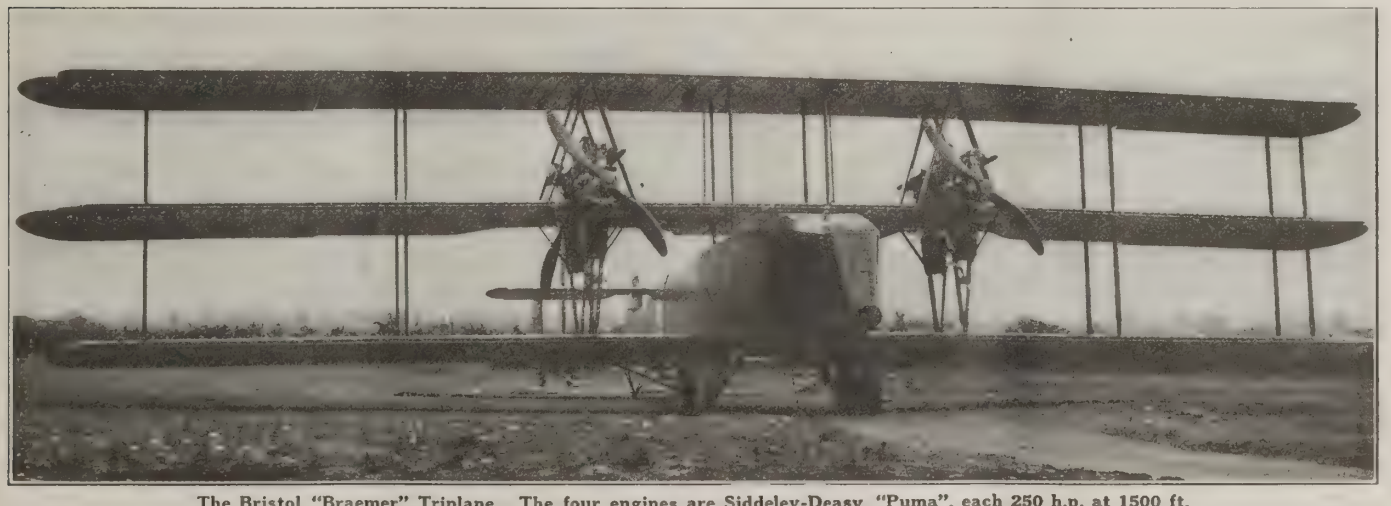
The Bristol Fighter, equipped with a Rolls-Royce or Hispano Suiza engine

The Bristol "All-Metal" Biplane

From the earliest days of aviation the question of wood versus metal construction has been the subject of discussion, and both methods have had their supporters. Up till the present, however, the wood construction has been predominating, at any rate in Great Britain. Particular interest therefore attaches to the few examples of the metal construction method that have been built. Among these is the Bristol type MRI, shown in the accompanying illustrations. It will be seen that although the All-Metal machine is of somewhat larger dimensions than the Bristol Fighter, the loaded weight of the two machines is practically the same. Against this must be put the fact that the MRI has a 170 h.p. Hispano engine, while the F2B has a 260 h.p. Rolls-Royce. The All-Metal carries, however, slightly more fuel than does the B.F. The loading per sq. ft. is somewhat smaller for the larger machine, but the load per horsepower is considerably greater, thus accounting for the fact that the MRI has not so good a performance as the F2B. It might be added that the weight, empty, of the B.F. is 1,750 lbs., and that of the MRI 1,700 lbs. It may, therefore, safely be concluded from these particulars that there is no reason to suppose that an all-metal aeroplane cannot be built as light, or nearly so, as one constructed in the ordinary way of wood. There can be little doubt that for use in tropical climates, such as will be encountered by the post-war commercial aeroplane, the metal construction will be better able to withstand the changes in temperature than will one built largely of wood, and while we should not care to assert that the days of wood construction for aeroplanes are over, we do think that metal construction will be more general in the future than it has been in the past.

The Bristol Triplane

While for her largest machines Italy has to a great extent pinned her faith in the triplane, as instanced by the large Caproni triplane bombers, there has been in Great Britain a tendency, rightly or wrongly, to adhere to the biplane type, even for very large machines. That excellent results may be obtained by the biplane form has been amply demonstrated



The Bristol "Braemer" Triplane. The four engines are Siddeley-Deasy "Puma", each 250 h.p. at 1500 ft.

Table of weights, etc., and performance of "Bristol" machines.

Type of machine.	Engine.		Weight of machine (loaded).	Fuel capacity (gallons).		Range (in miles).	Speed (m.p.h.).			Climb (in mins.) to		Ceiling.	Stalling speed.	Landing speed.	Load/sq. ft.	Load/h.p.	Military load.
	Type.	H.P.		Petrol.	Oil		Near ground	10,000	15,000	10,000	15,000						
			lbs.									ft.	m.p.h.	m.p.h.	lbs.	lbs.	lbs.
Scout D ..	Le Rh.	80	1,250	27	5½		100	86		18·5				44	6·25	14·7	60
Scout F ..	S.A.	200	2,100	32	5		138	128		8·5	16·0			49	8·08	10·0	270
Monoplane	Le Rh.	110	1,300	20	5		130	117		9·0	19·0			49	8·97	10·8	80
Fighter F2B.	R.R.	264	2,800	45	4		125	113		11·5	21·5			48	6·92	10·6	270
"All-Metal"	H.S.	170	2,810	50	5		110	98		20				47	6·13	16·5	270
Bomber ..	4S.D.	250	16,200	400	40		106	93		35				55	8·50	16·2	2,960

Le Rh. = Le Rhone. S.A. = Sunbeam "Arab." R.R. = Rolls-Royce. H.S. = Hispano-Suiza.
S.D. = Siddeley-Deasy ("Puma").

Table of dimensions of "Bristol" machines.

Type of machine.	Length o.a.	Wing span.		Wing chord.		Wing area.*			Incidence.		Gap.	Stagger.	Sweepback.	Dihedral.		Aileron area.	Area.			Area.		
		Top.	Bot.	Top.	Bot.	Top.	Bot.	Total.	Top.	Bot.				Top.	Bot.		Tail-plane.	Ele-vators.	Total.	Fin.	Rudder.	Total.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	square feet			°	°	ft. in.	ft. in.	°	°	°	sq. ft.	square feet.			square feet.		
Scout D ..	20 8	24 7	24 7	4 6	4 6	103·5	96·5	200	2½	2½	4 3	1 9	0	3½	3½	23·5	23	15	38	0	7	7
Scout F ..	20 10	29 6	26 2	5 7	4 11	150	110	260	1	1	5 1	2 1	0	9	0	30·5	15	14·5	29·5	4·1	5·3	9·4
Monoplane	20 4	30 9	..	5 11	..	145	..	145	0	..	..	..	0	2	..	18	20	15	35	5	4·5	9·5
Fighter, F2B.	25 9	39 3	39 3	5 6	5 6	202·5	202·5	405	1½	1½	5 5	1 5	0	3½	3½	50	22·2	23·2	45·4	10·7	7·2	17·9
All-metal..	27 0	42 2	42 2	6 0	6 0	235	223	458	0	0	5 11	0	0	3½	3½	59	27·8	30·0	57·8	7·8	8·25	16·05
Triplane†	5 1 6	81 8	78 3	8 6	8 6	650	605	1,905	2½	2½	7 2½	0	6½	2	2	192	96·5	85·0	181·5	28·2	25	53·2

* Including *ailerons*. † Centre plane: Span 81 feet 8 ins., chord 8 feet 6 ins., area 650 sq. ft.

by the large four-engined Handley Page, but it may be doubted whether the triplane form has been as extensively tested as it deserves. The object of the Bristol Bomber was to provide a high-speed machine for bombing or passenger carrying, capable of lifting a considerable load in addition to the weight of crew and fuel. The "Braemer," as the Bristol Bomber is called, is driven by four Siddeley-Deasy "Puma" engines, developing a total of 1,000 h.p. at 1,500 ft. Two of the engines drive tractors while the other two drive pushers, after the manner of the large Handley Page. The two tractors have a diameter of 9 ft. 10 in. and a mean pitch of 6 ft. 11 in., while the diameter of the pushers is 9 ft. 2 in. and the pitch 7 ft. 2½ in. The two pilots' seats are placed side by side in the fore part of the body, some distance ahead of the leading edge of the planes, while the extreme nose of the fuselage is occupied by a gunner. Well aft in the body is another cockpit with two guns mounted on a turntable, while a fourth gun is mounted on another gun ring in the floor of the fuselage. The machine is thus well capable of looking after herself as regards defensive gun arrangements. The following instruments are carried:

On dashboard: 2 air speed indicators. 4 radiator themometers, 4 revolution indicators, 4 Liberty switches and voltmeters, 1 switchbox for electric lighting, 1 altimeter, 1 cross level, 1 watch. Electric lighting set for each instrument.

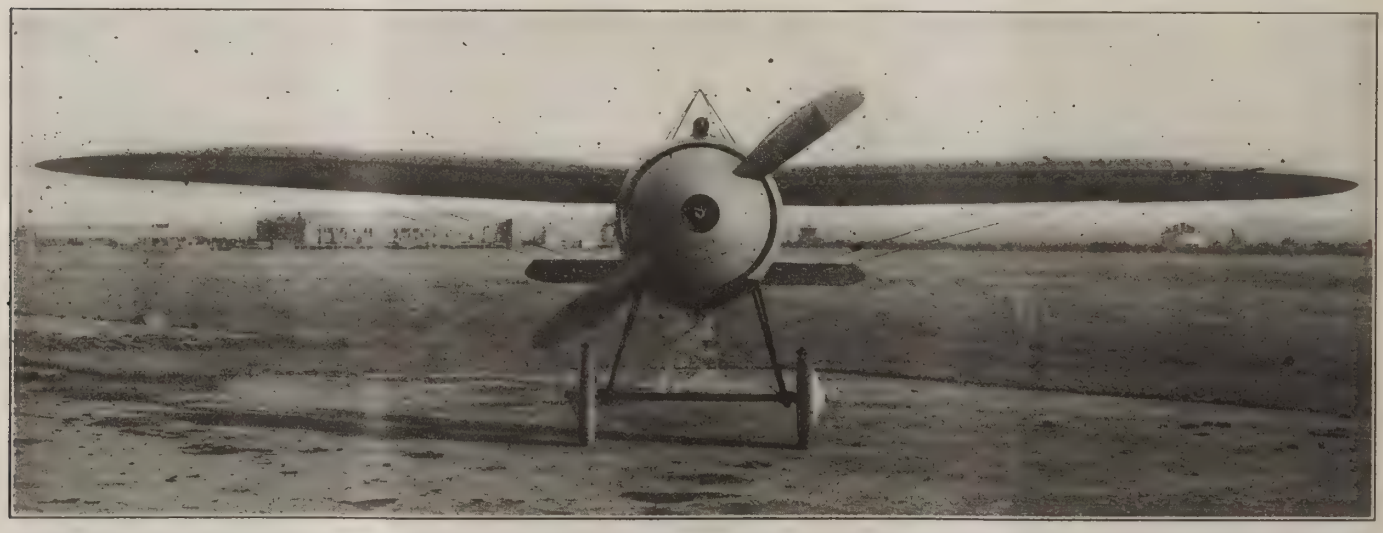
Below dashboard: 1 compass.

In forward compartment: 1 air speed indicator, 1 altimeter, 1 high altitude bomb sight. These are for bomb dropping.

Rear of pilot's seat: 1 air speed indicator, 1 altimeter, 1 gyro bomb sight. Flowmeters for petrol. These are for bomb dropping.

On engine housings: 4 oil pressure gauges.

The weight of the machine empty is 9,300 lbs., and she carries 400 gallons of petrol, 40 of oil, and 30 gallons of water. After allowing 360 lbs. for two pilots, the machine is still capable of lifting another 3,000 lbs., bringing the total loaded weight up to 16,200 lbs. The wing loading, it will be seen, is fairly high, 8½ lbs. per sq. ft., and the load per horsepower is 16.2 lbs. The speed at ground level is 106 m.p.h., which is not bad for such a large machine, and the climb to 10,000 ft. only takes 35 minutes. Naturally the performance cannot compare with that of the smaller machines, but for a weight lifter it is not by any means poor, and the machine might make a good commercial aeroplane for carrying large loads.



The Bristol monoplane makes a speed of 130 m.p.h. with a 110 h.p. Le Rhone engine

SOME PROBLEMS IN THE DESIGN OF WOOD PROPELLERS

Relative Value of Different Woods. Advantages and Disadvantages of Different Methods of Blade Tipping

By LESLIE V. SPENCER, M. E.

IT is safe to say that no part of the modern aircraft has been given more attention from the design and construction standpoints than the propeller. Yet, in the majority of cases, there is perhaps no unit of the ship that gives more trouble. There are so many things to be taken into account in making the stick, and so many different types and species of woods that can be employed, that development and research work on this part alone occupy as important a place in aeronautical engineering work as is given to the design of the engine or of the plane itself. Not only that, but after the propeller is constructed, very elaborate precautions must be taken to maintain it at a constant moisture content when in storage, else warping and cracking or parting of the laminations will result, rendering the screw of little value from the service viewpoint. In addition to all this, some means of covering or sheathing the blades is most advisable to protect them against tall grass, water spray, pebbles and the like, all of which are enemies of the rapidly revolving blades.

When it is further considered that any given shape and size of propeller is usually suited to only one design of plane, necessitating a different screw for each type of plane, it will be seen that the flying field having several different models or types of planes in its equipment will be confronted with the problem of storage for a large number of different shapes and sizes of propellers.

Propeller Woods

A great many propellers of nearly every practical species of wood have been whirled to destruction at the propeller testing laboratory at McCook Field, and from the results obtained, it appears that oak is the most satisfactory wood for propellers from the standpoint of strength. Where screws made of many other woods could not withstand the required whirling speeds used in the tests, the oak propellers in nearly every instance underwent the tests without breaking.

Walnut has proved itself almost the equal of oak, and where properly designed, propellers of this wood are undoubtedly entirely satisfactory. Walnut, however, is harder to obtain with satisfactory grain than oak, so that, all things considered, oak has a shade the advantage.

It must be remembered that this refers only to the strength characteristic of woods. In some instances the weight of the wood must be given great consideration, and as both walnut and oak are heavy woods, they might not always be most desirable, everything taken into account. In general, in selecting the wood for a given type of propeller, account must be taken of the tendency to warp, the weight and the strength, so that simply because a wood is very strong is not conclusive evidence that it is desirable.

Another very satisfactory propeller wood is Honduras mahogany, and while many species of mahogany have a tendency to split or warp, this variety seems well suited to propeller work. The average run of commercial mahogany, however, does not appeal to be very well adapted to propeller making for lack of strength. African and Philippine mahogany is not very highly regarded for propellers because of this cracking and warping habit under load. Perhaps these differences between the various species of the wood are due in large measure to the fact that mahogany as a designation



Figure 1

Cross section of a flat sawn blade. The use of quarter-sawed wood would result in more nearly parallel growth rings

for woods is a much abused term, in that the characteristics of the different types vary widely, so much so that it is often considered that many species of woods that go under the name of mahogany are in reality not mahogany at all, but very likely some related wood having somewhat the same appearance.

Cherry is another wood that has given highly satisfactory results in the construction of most standard types of propellers. The wood possesses great strength, and has a certain elasticity or "give" to it that is often a desirable feature, especially in certain designs of screws.

Poplar and spruce are good woods for the ordinary propeller shapes, although not recommended for sticks that are of a design which has a tendency to fluttering at high speeds. Spruce is comparatively

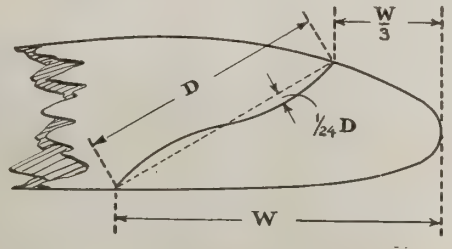


Figure 2

Dimensions of a good type of brass tip for ordinary service conditions

weak in tension (weaker than oak, walnut or mahogany).

Prima vera has also been experimented with, but it is not very highly regarded for propellers. Being a very hard and dense wood, it is heavy, and its hardness leans to brittleness, which often has resulted in cracking under test loads. It is possible that there is not enough elasticity to the material to take care of sudden applications of heavy loads, and as prima vera does not appear to have advantages that many domestic woods have, while at the same time it possesses several disadvantages, it does not appear to merit much consideration for the purpose.

There are, of course, various combinations of woods that have proved very satisfactory in the construction of propellers, such as mahogany and walnut, oak and cherry, etc.

Quarter Sawing

With the object of reducing warping and curling of the blades, it is advisable to use quarter-sawed laminations in preference to flat-sawed pieces, this applying more particularly to our domestic species of woods. Where flat-sawed material is employed, usually the direction of the growth rings in the several laminations is such that unequal warping results from variations in the moisture content. The illustration, figure 1, shows a cross-section of a blade made from flat-sawed stock, which brings out the point. The tendency to warping could have been greatly reduced or eliminated by employing material having these growth rings running in approximately parallel lines.

Methods of Blade Tipping

No process of tipping the blades of propellers (particularly the leading edges) has as yet been devised that is entirely satisfactory from all standpoints, although the development of the use of such materials as pig skin, linen and cotton has been very satisfactory as a whole. These coverings have shown good results where sand and gravel and long grass are encountered, as well as proving quite satisfactory as protection against wet grass, rain and water spray under moderate conditions of exposure. But where the propeller is subjected to severe service conditions, such as the necessity for coping with long or tough grass, gravel, flying chips and water spray, metal tips of copper or brass are as yet the only means of protection that have met with any degree of success.

It might be well here to draw a distinction between the tipping or covering of blades for the purposes above mentioned and the coating of propellers by any one of the several methods now practiced for protecting against moisture. The most generally used process for moisture exclusion is by coating the entire screw with aluminum leaf, this usually being put on over the regular tips that are applied for protection against abrasion. Thus, while an outer coating of this kind is often applied, particularly where a propeller is to be in storage for any length of time, it is not intended as a guarantee against chewing or wearing of the blades, but is merely a moisture-proofing scheme, and is to be distinguished from the protective tips.

Copper and Brass Tips

There are two classes of service for which the metal tips of copper or brass seem to be the only kind suitable. These are training planes and seaplanes or flying boats. With the watercraft, it is evident that the greatest protection must be afforded against the constant water spray when the seaplane is on or close to the

water surface, and nothing short of a metal leading edge seems to be satisfactory. With training planes, due to the service they perform, the propellers are of necessity given very severe usage, since the plane must do a great deal of taxi-ing and warming up of the engine. About half the time that a training plane engine is running the ship is on the ground, which means that the propeller of such a plane is subjected to abrasion from one cause or another to a very much greater extent than that of a plane in regular service, since the latter is usually in the air a good share of its engine's running time.

It is true that at most training fields, measures have been taken to protect the screws as much as possible by having wooden platforms or concrete pavements on which the planes are run whenever the engine is to be operated for any length of time on the ground. This, of course, reduces the chances for abrasion from the picking up of loose matter, but it is of no value as soon as the plane is put through taxi-ing manœuvers such as required to give the student a working knowledge of the ship before it goes into the air.

Earlier difficulties with the heavy metal tips are now in a large measure overcome by accurately locating the holes in the metal so that the attaching rivets or screws will be in exactly the same positions with respect to the two blades, thus preserving the balance of the propeller, and also by carefully staggering and locating the rivets or screws so that there is less tendency to split the wood and to pull loose due to the high centrifugal forces set up in operation.

Of course, the metal tip is not satisfactory for the very light type of propeller which tapers down to quite a thin tip. It is very difficult to attach the metal tip to such a blade without the screws splitting the thin wood or pulling out when the propeller gets in service. Further, the light blade is prone to fluttering excessively when metal covered, a disadvantage that soon means cracking of the wood or of the tip or both. The propeller must have sufficient body to form a satisfactory "anchorage" for the metal sheathing, which limits this kind of tipping to the heavier sticks such as used on seaplanes, large service machines and most training planes.

An important consideration in the use of metal tips is the lapping. There have been many instances where poor soldering or improper position of the seam have resulted in the tips pulling loose or opening up in service. It is best to have the lap at the leading edge, the metal being carried around on either side of the edge so that there is a double thickness at this point. The seam should be on the back face of the blade. The English specifications call for a lap on either side of the edge of 11 millimeters, and this has proven quite satisfactory. In American practice, about ⅜ inch is best.

As to the matter of screws or rivets, the general rule is to use one brass screw per square inch of metal surface, or one copper screw per 1½ square inch of surface. The screws should of course be staggered as referred to the front and back faces of the blade, and they should also be carefully positioned with respect to the grain of the wood so as to eliminate as far as possible chances of splitting from striking the grain improperly. This especially applies to the screws at the outer ends of the blades.

In designing metal tips, care should be taken to bring them well in toward the hub on the leading edge, the trailing edge being more or less unimportant, except in the vicinity of the tip. It has often been found that, where the length of the tips on the leading edge was inadequate, chewing would take place along that portion of the edge from the tip in toward the hub, where otherwise the blade was all right. The length of the tip should be anywhere from one-quarter to two-thirds the length of the blade, the exact distance being dependent upon the kind of service for which the propeller is to be used, etc.

A typical form of a brass tip is shown in figure 2. This tip is best made of 24-guage material, and there should be 114 screws in each face of the tip, these screws being ⅜ inch No. 4. Such a tip would ordinarily be suitable for a service plane or a training machine subjected to moderately hard usage.

Referring to figures 3, 4 and 5, some typical cases of tip failures are illustrated. In figure 3 the blade was too thin for the tip and the resulting flutter cracked the wood, as can be seen, with the end of the metal sheathing finally cracking off. Figure 4 indicates what happens to a metal tip when coming in contact with a stone or pebble of fair size. This tip was struck on the leading edge by the stone, and the metal was split in several places as a result. Figure 5 illustrates a case where the tip has pulled away about ¼ inch due to centrifugal force or looseness of the attachment. This might be the result of using the wrong kind of screws or rivets, or from not correctly spacing them.

Cotton and Linen Tipping

Although cotton and linen will not, of course, give the tips as much protection

(*Continued on page* 1059)

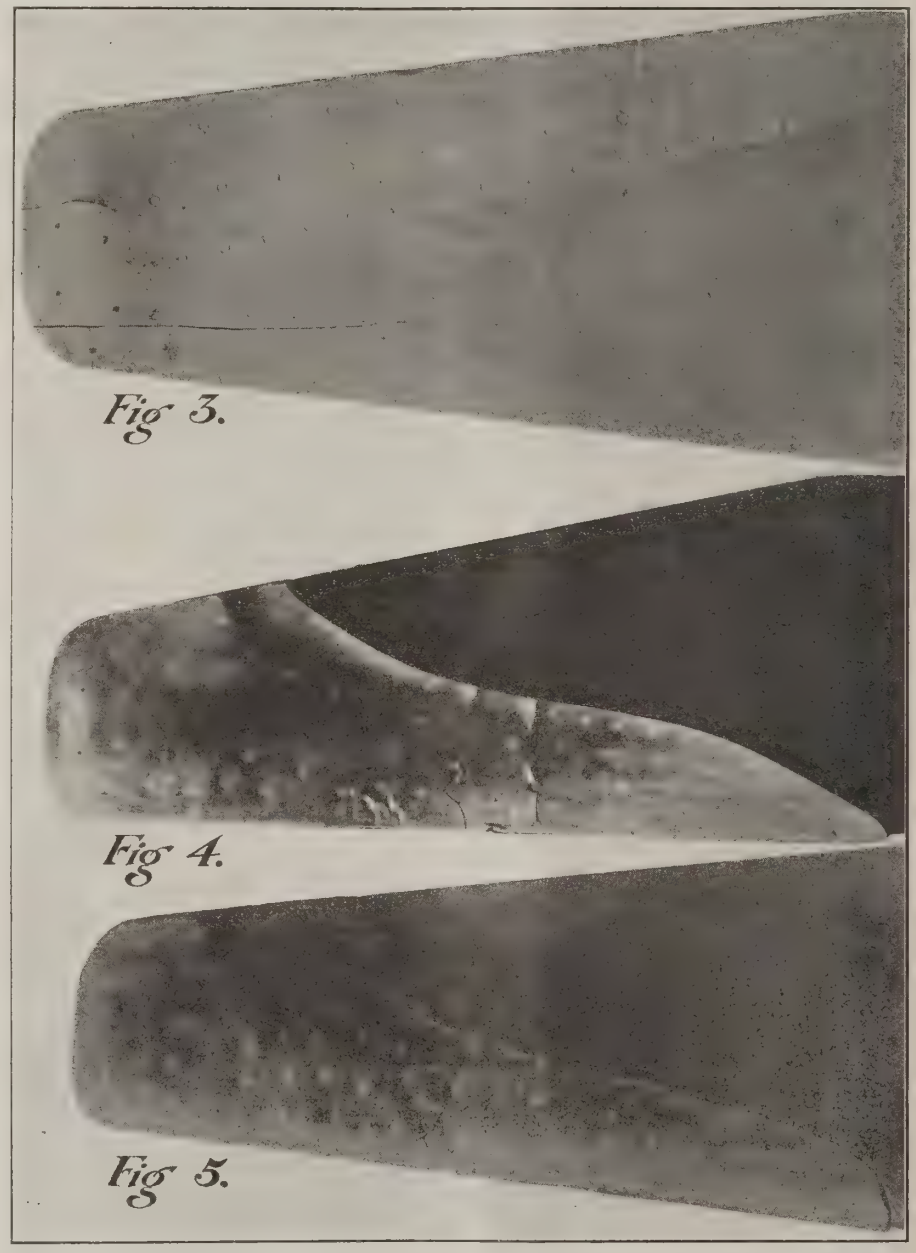


Figure 3

This blade is too thin for a metal tip. Fluttering cracked the wood and chipped off a portion of the tip

Figure 4

Showing a cracked tip due to a large stone hitting the leading edge. Even the metal is not protection against such accidents

Figure 5

Centrifugal force has pulled this tip off about ¼ inch—the result of improper attachment or unsuitable screws or rivets

PRELIMINARY NAVAL FLIGHT INSTRUCTION

By NICHOLAS S. SCHLOEDER

(*Continued from page* 1016)

Turns

TURNS which are comparatively "safe" can be made in great variety, but an exactly correct adjustment of bank and curve can only be executed by exercise of much care. In most turns, the pilot either skids or slips. Skidding outward results from too little "bank," which compensates for centrifugal force; or conversely stated, too much "fudder." Slipping inward is the result of excessive bank, the centrifugal force being insufficient to keep the machine in its normal trajectory. Usually the skid or slip is very slight, but a student should strive to make his turn as nearly perfect as possible.

Certain suggestions will assist a student in a proper adjustment of controls. First of all, it is usually necessary to depress the nose to make up for loss of speed on a turn. In relation to this, overbanking has a tendency to raise the nose, as skidding has to depress it. Another point to remember is that students invariably begin turns too vigorously, the cause of nearly all imperfection in turning. To make embryo aviators feel their turns is the subject of much vain pleading on the part of instructors. Lastly, the proper sequence in the use of the various controls is very important. Though theoretically, all controls should be used at once, the following empirical rules for students should be helpful. Firstly: Use elevators to depress nose slightly. Secondly: For left-hand turns aileron to moderate bank, and lastly: Apply rudder. For right-hand turns, aileron and rudder may be applied simultaneously.

The difference between turns to the left, and right, is due to the action of torque. Though any tendency to confine one's self to a habitual turn one way or another should be discouraged, yet it must be learned that greater care is exercised in all evolutions to the left. Skidding is far more common on left turns because a student forgets that torque alone is sufficient, and therefore by ruddering even slightly to the left, excessive rudder action results. Positive left rudder should never be applied unless a sharp turn is desired, in which case the bank must be correspondingly steep. For moderate turns to the left a release of the customary right rudder is sufficient.

A student must learn by feeling. Wind on the side of his face will assist. Wind pressure felt on outside denotes a skid, on the inner side, a slip. Of the two, skidding is more objectionable and far more common. For all altitudes above a few feet, it is a more unstable condition, implying the use of excessive rudder, which on left turns where a tendency to stall exists, directly invites a spin.

To illustrate this point, a common method of spilling follows a course something like this: A student has a low-powered machine, we will assume. He is close to the water and is about to make a turn. He is anxious to "get around," we will say. He applies hard rudder. The machine skids, as considerable bank is necessary to compensate the centrifugal force outward, which of course, the student fails to execute. Now the machine, moving as it does, sideways as well as forward, thereby loses some of its lifting power and consequently settles. The student now becomes alarmed, fearing that he will strike the water before completion of his turn. He instinctively pulls back his elevators, hoping to raise himself. What has resulted? He is now in an ideal position for a spin—rudder hard over, elevators pulled back. A bump sends the nose up, and—over he snaps, tail up, outer wing lifted, hitting the water at an oblique angle. Some one on the beach shouts "sideslip!" which is once more incorrectly held responsible; whereas in fact, it was nothing less than the first part of a spin, due originally to a skid.

If a student is taught to begin a turn cautiously, it is not necessary to impress upon him the need of aileroning and ruddering against a turn after it has been begun, upon the theory that it takes more control to start a turn than to maintain it. This is largely true only of sharp turns. Too much control at the start with subsequent correction, is responsible for the jerky, slovenly turns, alternately steep and flat, nose up and down, so characteristic of beginners.

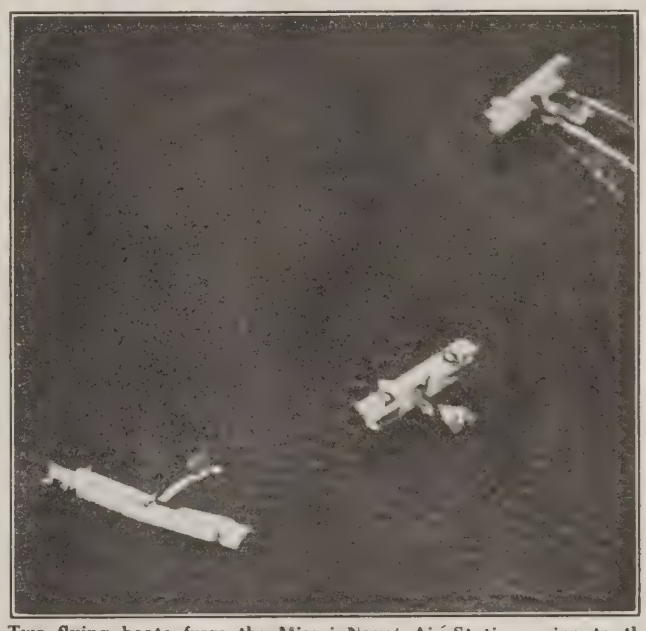
Getaways

The getaway or take-off includes three distinct phases, fundamentally the same on all machines, though differing considerably in the length and degree of each phase. They are, in order, raising the nose of pontoon or hull clear of the water; throwing the pontoon on the step over the surface of water, and finally, planing on the surface of the water until flying speed is attained and the machine takes the air.

The purpose of the first phase is to clear the nose of machine from interference by waves. The elevators are pulled back to the chest. However, in smooth water, this is unnecessary. Indeed, it is desirable to hold elevators in neutral whenever the sea permits.

To force a machine out of water and on the step, the yoke is thrown forward when the nose of the pontoon has reached its maximum height, and so held till the nose slowly drops as the machine climbs on the step, when the elevators are gently pulled back to neutral. Considerable pressure is often required to hold the elevators forward, though in some machines, as the Curtiss R's, the machine climbs on the step of its own accord.

Many beginners experience difficulty in knowing they are planing on the surface. The fall of the nose and increased speed are certain indicators. If the student is slow to discover this and continues to hold the yoke forward, violent "porpoising" or rocking forward and aft will result. The student should under no circumstances attempt to combat this by moving his elevators backward and forward. Simply pull back gently to neutral as before noted, and the "porpoising" stops at once. Sometimes the pilot pulls back too far, so that the machine jumps off the water momentarily, before attaining air speed, a condition closely approximating a true porpoise. This is very common in H-boats and R's, and the student must learn to distinguish between it and a true porpoise, which is always the result of controls held forward of neutral.



Two flying boats from the Miami Naval Air Station going to the rescue of a student flyer who made a bad landing

Difficulty will be experienced in putting a machine on the step whenever the engine is failing. Many devices are used in such cases. Some endeavor to rock it on; that is, by jerking yoke forward and back, they hope literally, to throw it on. This is a common fallacy. This motion constitutes a drag and hinders rather than helps by resultant reduction in speed. Whenever a machine must be "put" on the step, the controls should never be held more than two-thirds of the maximum distance in front of neutral. Rocking is advisable only through a slight arc about neutral. I have found that an arc from neutral to slightly in front of it is the most effective; any greater radius is absolutely fallacious. Sometimes a slight rudder and aileron action is helpful to overcome the chance of a vacuum having been established behind the step.

All other methods fail where the shallow water method will succeed. Running through water having a maximum depth of about three times the draught of the machine, to a minimum depth equal to its draught, is unfailing where the machine will fly at all. The water, having no chance to escape, piles up in front of the bow of the pontoon, so that the fulcrum moves far back to the rear of the pontoon and with this additional leverage the machine easily attains the surface.

The final phase, the take-off, presents no special difficulties. The controls are held in neutral as the machine skims over the surface until flying speed is attained, when it takes the air without assistance. A machine should never be dragged off. Care should be taken to keep the wings level, otherwise a wing tip pontoon will bury itself in the water, causing the machine to swerve. Only with R's are the elevators held back of neutral in the take-off; they are neutralized at once upon clearing the water to prevent stalling. This tendency to stall is a common error. Students must not be too anxious to climb; this will take care of itself, and will certainly not be assisted by stalling.

The getaway is always into the wind, unless as on the high seas, when it is sometimes advisable to run parallel to the waves. To keep a machine into the wind, hard rudder is frequently necessary, especially where a wing tip pontoon has caught in the water. Failure to keep into the wind is the chief failing of students. Learn to keep the wings level and use rudder actively, which is necessary to take-off in a neat direct course into the wind.

Landings

Landings are the bane of most preliminary students, who are inclined to exaggerate their importance and difficulty. The principle part of a landing, briefly, are the glide, first point of leveling off, final point of leveling off, loss of flying speed, the squash, contact with water and final penetration of water. Landings may be conveniently divided into two kinds, differing slightly in the relative time and place of these phases, and are variously called speed or step landings, and stall, squash or slow landings.

On all machines save F-boats, it is not particularly advantageous to assume a gliding angle before the engine is throttled. The disadvantage of this practice results from the racing of the engine. The best practice, perhaps, is to make this throttling simultaneous, using the right hand to slowly cut the power, while the left moves the yoke forward. The correct gliding angle should be assumed at once, the student adjusting his controls accordingly, after which he must strive to hold it until the time for the first point of levelling off is reached. The right rudder must be taken off during glide. Failure to do this is a very common fault. Many instructors exaggerate the importance of a steep gliding angle. Notice, I speak now of the glide to a landing, which should always be straight into the wind from an altitude of not less than two hundred feet. In such cases, favorable conditions are prime, and the dangers of flat glide are absent. These exist only in and from spirals, etc., where the rudder is out of neutral. Remember, spins do not occur with neutralized rudder, and "slips on one wing" only through positive stalls. Moderate glides are best for beginners, as it aids them to find the water and so shortens the period of instruction. However, the student should learn to glide steeply as soon as he can land, as speed is the best insurance against adverse air currents just above the water.

The second phase, the first point of leveling off, occurs between fifteen and twenty-five feet up. The elevators must be gently withdrawn, otherwise the pilot will find himself in horizontal position before he is within striking distance of the water.

Indeed, this movement should be so regulated that the third phase, the final point of leveling off, should not occur at a greater distance than about three feet above the surface of the water. When this occurs directly at the surface, the landing is said to be fast. Thus, the position of this point determines whether the landing is step or squash, and the sequence of subsequent phases.

The fourth phase, loss of flying speed, occurs simultaneously or after contact with the water in a step landing. In slow landings, immediately follows the completion of the third phase, which, occurring above the surface, involves another phase non-existant in step landings. This is the squash or stall.

A machine which is maintained in horizontal flight without power soon loses its flying speed and settles rather precipitately. Now, as the machine drops suddenly on the water, it is important to make the contact such as to minimize the chances of breakage, as well as to prevent a rebound. This is accomplished by a quick withdrawal of the yoke which stalls the machine and makes contact on the rear of the pontoon back of the step. Thus a sharper edge for settling on the water is presented, thereby preventing a bounce, while the greater penetration of the water acts as a cushion to prevent breakage. More important still, the tail landing implies a maximum angle of incidence, which markedly increases lift, and thereby arrests the suddenness of squash and force of contact.

The last phase, final penertation of water, occurs after contact with water in step landings. In coming off the step no difficulty is experienced save in R's, when a tendency to porpoise exists. Throwing the yoke forward is the quickest way to arrest this.

The diagrams, Figures 1 and 2, illustrate the difference between fast and slow landings.

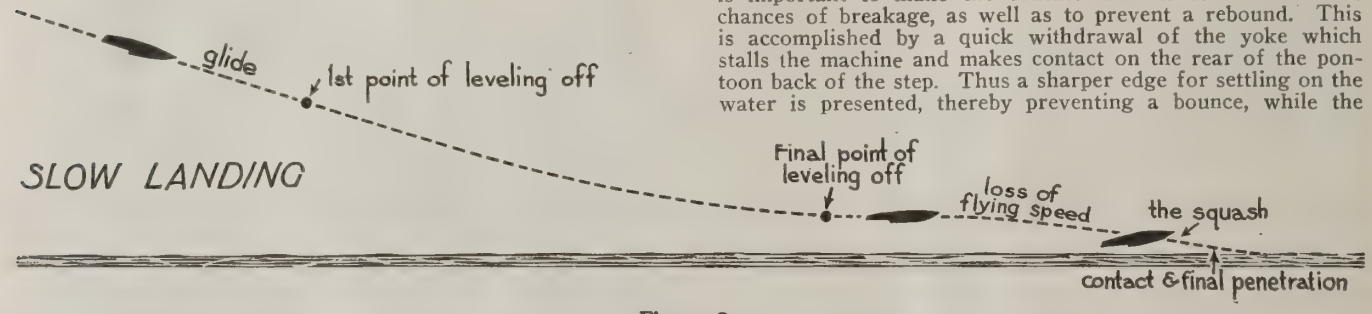


Figure 2

Diagram showing how the machine manoeuvres in a slow or "squash" landing

Slow Landing

In stopping for a moment to consider relative advantages of each type, it might be stated that step landings are not taught preliminary students. It will be readily seen that if the final point of leveling has occurred before contact, the pontoon will strike on its nose with great force, thereby either "nosing in" completely, or rebounding again to ten feet or more, where it will again be necessary to open the throttle and proceed, as recovery otherwise is very difficult for beginners. Squash landings, on the other hand, have a margin of safety.

The point of original leveling does not present special difficulties, as most students fix this within the proper attitude. However, there is a tendency to pull back too much, so that the leveling off process is completed too soon. In that event, it will be necessary to throw the controls forward again. This forward and backward movement of the yoke is known as "fanning," and it is more or less essential to beginners. With experience, the degree to which fanning is done is minimized, so that it is practically imperceptible, but all fliers, however experienced, "fan" their approach.

If students experience difficulty in approximating their distance from the water, in nearly all cases this is because they

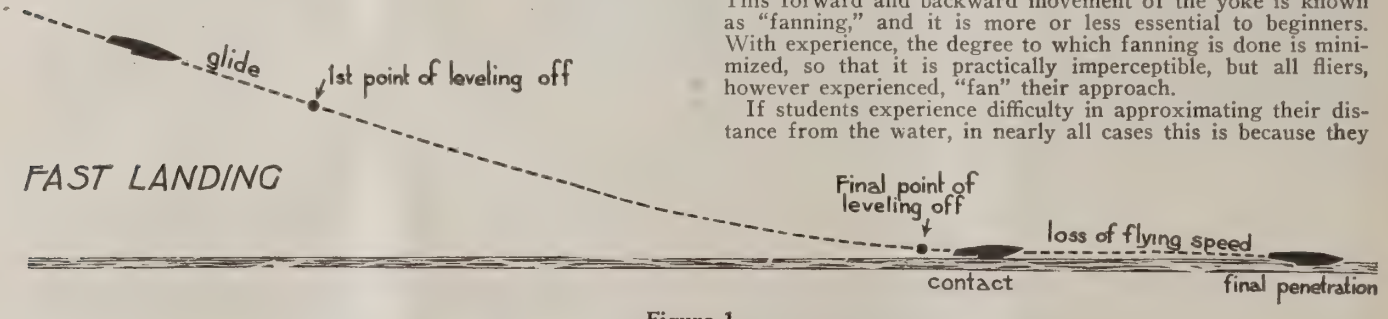


Figure 1

The path taken by a seaplane in making a fast or "step" landing

look directly beneath them. They should look as far ahead of the lower wing as their vision permits.

The point of final leveling off presents greater difficulties. The student places this at the proper height, but fails to maintain it because he permits the machine to ascend once more. This is termed "leveling off too much," as distinguished from "leveling off too high." Figures 3 and 4 give illustrations of this difference.

Leveling off too much is the more common fault. To combat it the student must learn to act quickly and throw his control forward the moment he finds himself once more ascending, always remembering, however, to pull back again the instant this upward movement is arrested. Hence the great importance of fanning.

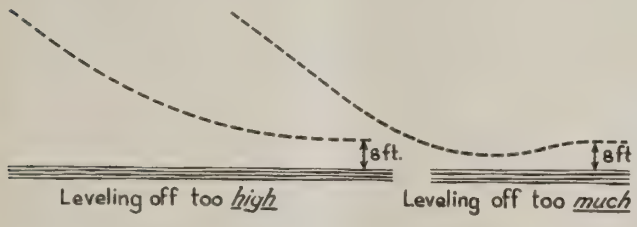


Figure 3

Figure 4

The phase which includes loss of speed in air has the faculty of trying the patience of the student, for he appears to dislike holding the machine level. He signalizes this as a rule by either a premature attempt to put it on the water, with a certain rebound at this great speed, or by heaving back in anticipation of the time to squash, which results in a veritable "zoom."

Many landings hitherto well executed, with the point of loss of flying speed at the proper height, are spoiled by failure to "squash" properly. As the machine settles the controls must be pulled back rapidly, often to the chest. Bear in mind, no matter how the glide, the approach, or the amount of fanning, always be sure when hitting the water that the controls are well back and that the tail of the pontoon is the point of contact. Failure to do this is the cause of more faulty landings than all other faults.

It is better to level off too high than too low. Some students confuse leveling off too high with too much, and therefore attempt to compensate by steepening the glide. This only augments either error, because the faster the glide, the quicker will the leveling off process occur, with greater resultant reascension. Others hope to correct these faults by not leveling off at all, and these are the despair of instructors.

Flexibility in controlling and a resolution to land on the tail, are the chief aids to a mastery of the art of landing. Likewise, the student must ever bear in mind that the psychological idea uppermost in landing is not to *put* machine on water, but rather to *permit* it to put itself on.

Recovery from a "bounce" is quite important. Where the rebound is hard, open throttle and proceed, particularly when it results from failure to level off. When a skip is slight, it is only necessary to withdraw controls a trifle. Rebounds occur on slow landings from failure to "squash" machine on the tail of pontoon. In such cases throw machine forward as it travels upward, and quickly pull controls back to chest as it settles. Generally it is not necessary to proceed with throttle from a bad stall landing, for the first contact in such cases is always the hardest.

Sometimes when the student is in doubt as to the real cause, it is permissible to give half throttle and hold controls back until the machine settles to water. This is called a power landing.

Hitherto, on this subject, I have spoken almost exclusively of longitudinal control. Now it is quite as important to maintain lateral stability as in flight. Landing on one wing, causing machine to swerve violently, places great strain on the structure.

Not the least important is the use of rudder in order to maintain landing directly into wind. Cross-wind landings result in side drift, usually incorrectly referred to as a skid. The wind will carry machine sideways, and such a landing places greater strain on the pontoon structure. To minimize this it is necessary to kick rudder into direction of drift; an attempt to overcome this drift by ruddering against it will only aggravate the fault. This is a very important feature of landing. Should a true skid occur, the same rule will apply.

Spirals

The fundamental principles which govern spirals are much the same as turns; in one case the motive power is derived from gravity, in the other, the engine. Many students forget this, consequently the failure to bank quite as much as on turns results in the common fault of skidding. This is particularly bad in a flat glide, as it invites a spin.

In executing a spiral, the rules of rudder and aileron action apply as on a turn. Care must be taken, inasmuch as gravity is the motive power, to glide straight until sufficient momentum is attained. Overanxiety to begin the turn is a common fault.

In shooting a mark, students are often so intent on reaching it as to disregard the necessity of momentum, with consequent spills. On the other hand, students often go to extremes to avoid a flat glide, as the spiral seems to confuse their judgment. Nosing down too much, while it is not dangerous, is nevertheless amateurish and inexpert. A pilot should not lose over one thousand feet in a complete turn, which is a safe margin for a beginner.

In spiraling into the wind for a landing, if the pilot finds that he cannot quite get around, it is preferable to land cross-wind, rather than take a chance of making a too sharp turn just above the water.

"Flipper" spirals will be considered in the remarks on inverted control.

Inverted Control

The theory of inverted control in air flight is the substitution of resistance to centrifugal force for that to gravity. In other words, an inverted control turn, commonly called "flipper" turn, is made so sharply that the reaction due to centrifugal force becomes more potent than that due to weight.

As may be presumed from this, the amount of bank is very great, varying from about forty degrees to almost vertical. It can easily be understood that, as this bank increases, the rudder position in relation to the horizontal moves from vertical to horizontal, while the elevators correspondingly move from horizontal. Now when the bank is great enough to imply inverted control, this change has progressed to the extent that the rudder is more or less horizontal, the elevators vertical. Thus, in relation to gravity, the rudder has become the elevator, and the elevator the rudder; hence the name "inverted control."

The practical way to accomplish an inverted turn varies. The usual method is to begin a customary turn until a forty-degree bank is attained. As the degree becomes greater than this, the yoke is gently pulled back so that when the bank is practically vertical, the controls may be back to the chest. The farther back the controls, the sharper is the turn. The extent of withdrawal is so regulated that the nose of the machine remains just above the horizon. If there is any tending to stall in so doing, this simply signifies that the machine is not banked enough for that degree of elevator withdrawal.

The rudder position does not change, becoming a slight "down rudder" in the inverted position. Some experienced pilots do not use rudder at all in turning, but simply bank to the proper degree and then pull back correspondingly on the elevators. Some indeed, carry this to extremes, actually applying reverse rudder, which then becomes "up rudder" by the inversion; the bank in such cases must be very steep, and the withdrawal of the yoke, sharp. This is a rare practice in seaplanes, but it is cited for the benefit of those who believe it is necessary to rudder hard in order to make a sharp turn. Too much down rudder will precipitate a spin, particularly to the left. With excessive "up rudder," it is first necessary to stall and side-slip. The greater the bank the lesser the rudder used.

To complete an inverted turn, invert the order of beginning it by returning elevator to neutral, aileroning against bank and finally, neutralizing all surfaces.

The principles which govern "flipper" spirals are substantially the same as in turns, as before, differing only in the substitution of gravity for engine as the motive power. Speed must first be attained, and the descent regulated by the rudder (which has become the elevators). Too much "down rudder" will lead to a spin. On the other hand, with sufficient bank, and controls back, many seaplanes, such as R's, will take full "up rudder" without either spinning or stalling. A partial side-slip will result, with sufficient forward momentum to maintain the reaction to centrifugal force against the arc of the turn.

A skillfully executed "flipper" spiral is one of the prettiest and most difficult evolutions in flying; more so than many so-called "stunts."

(To be concluded)

NAVAL and MILITARY AERONAUTICS

Britain Pays Air Service $27,000,000

Washington, D. C.—According to a letter made public by the War Department, an agreement between the British Government and the War Department has been reached and a check for $35,176,-123.10 has been drawn to the credit of the United States; $26,947,069.10 of this amount is for the account of the Director of the Air Service for the following:

Liberty motors.....	$13,672,518.90
Aeroplane spruce..	13,274,554.20
	$26,947,069.10

This settlement is unique in many ways, including the large amount involved, the fact that most of the agreements entered into were verbal, and that no arbitrational committee was required to settle the matter. Chester W. Cuthell represented the War Department and Lord Moeforth, the Minister of Munitions for War, the British Government.

Air Service Authorized to Make Exhibition Flights

Washington, D. C.—According to an announcement of August 7, issued by the War Department News Bureau, the Director of Air Service is being authorized to grant requests for aeroplanes for exhibition flights whenever consistent with necessary activities of the Air Service, condition of material and the number and degree of training of the Air Service personnel provided all expenses incident to such flights are assumed by the local authorities.

All-American Pathfinders to Make Transcontinental Recruiting Flight

"The All-American Pathfinders," a complete squadron of thirteen Curtiss army biplanes, fully equipped, will start on a transcontinental flight from Mineola to San Francisco August 13. The planes will be under command of Major Ora M. Baldinger, and will fly in squadron formation throughout. The itinerary of the flight embraces fifteen states and covers 4,183 miles. Stops and exhibitions will be made at 171 cities.

This nation-wide flight is to be a campaign of education for the people of the country, as well as a recruiting campaign for all branches of the army. It will show the public the actual working of an air squadron operating away from a fixed base for the first time in the history of the country. The detachment will consist of twenty-two commissioned officers and eighty enlisted men, all specially chosen for their particular technical branch of the service.

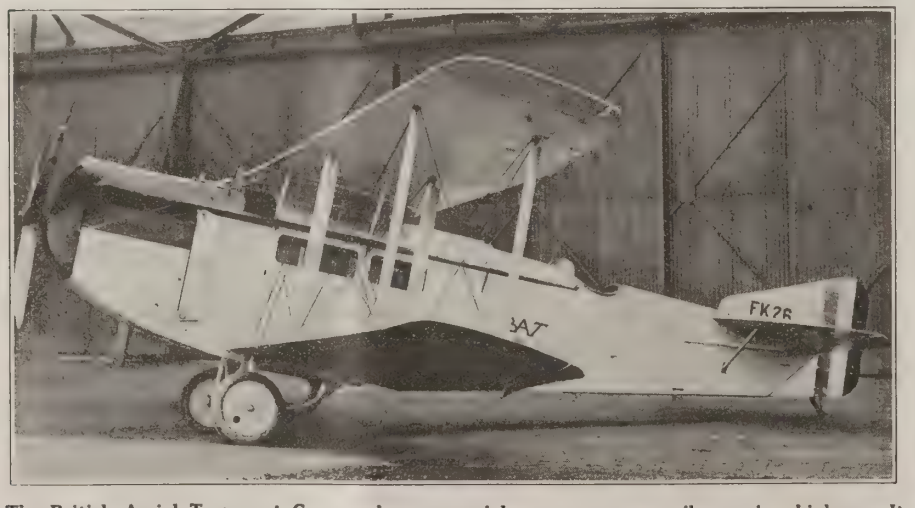
The squadron has been divided into seven sections, each performing a distinct function. The first is the headquarters and advance section, which will be the executive head for the unit, and also arrange for all base stops prior to its actual arrival.

The aerial routes, mapping and landing field section will compile and record all important aerial information. The recruiting section will examine and accept recruits for all branches of the army. The flying and field operations section will direct all flights. The other sections are radio, photographic and balloon and airship.

The radio section is equipped with the latest type of apparatus. Radio telephones will be used on all the machines, and will be operated over all important cities. Semi-daily reports of the progress of the squadron will be made to the War Department in Washington by wireless.

The balloon and airship section carries six specially constructed balloons known as the propaganda type. These will be flown at all base stops. In addition a full-size type "K" observation balloon will be inflated at each stop, so the public can examine the type of lighter-than-air craft used in the war. An accurate working model of the latest type of dirigible operated by electric power also will be exhibited.

In addition to these a special searchlight and field lighting section from the engineer corps has been attached to the squadron. This section carries a complete searchlight unit of the 60-inch anti-aircraft dishpan type. This light has a power of 250,000,000 candles, and its beams can be seen by an aeroplane from a distance of 110 miles. This section has also a complete field lighting set for illuminating an aeroplane landing field at night.



The British Aerial Transport Company's commercial, passenger or mail carrying biplane. It has a useful load of 1000 pounds, and is equipped with a Rolls-Royce Eagle VIII

Rank and Strength of Officers Reserve Corps

Washington, D. C.—A statement has been issued by the Statistics branch of the General Staff, giving the number and range of officers requesting regular army commissions in all branches of the services up to July 18, and the number and rank commissioned in the Officers' Reserve Corps up to July 31.

Rank	Requested Com. in Air Serv., Reg. Army.	Com'd in Officers' Res. Corps, Avia. (Flying).	Com'd in Officers' Res. Corps, Avia. (Non-flying).
Lieut. Col.....	3	0	0
Major	36	22	99
Captain	209	96	301
First Lieut....	561	446	621
Second Lieut..	1,529	4,025	1,818
Totals	2,338	4,589	2,839

In addition 15 have been commissioned as second lieutenants, balloon section, Officers' Reserve Corps, up to July 31.

270 Planes for Panama Canal Patrol

Washington, D. C.—It is stated that 270 planes have been shipped to the Panama Canal zone for patrol duty.

648 Air Service Contracts Yet to Be Liquidated

Washington, D. C.—The Statistics Branch of the General Staff announces that 648 contracts for the Air Service remain to be liquidated. The average value of all contracts liquidated or to be liquidated is $351,000 and the average value of those remaining to be liquidated is $297,000.

The value of the uncompleted portions of suspended War Department contracts that had been liquidated to July 19 totals $1,715,605,000, or 46.1 per cent of the total value of suspensions as reported to that date.

All Long Island Flying Fields to Be Abandoned

New York, N. Y.—According to statements appearing in the press, it is said that orders have been issued for the abandonment of all army flying fields on the Hempstead Plains of Long Island, which include Hazelhurst, Mitchel, Roosevelt and Brindley Fields. Col. Archie Miller, in command of all flying activities on Long Island, when questioned denied any knowledge of the alleged order. The rumor states that the 1,000 or more enlisted men stationed at the field have been ordered to aviation fields in Florida and Texas. The 500 or more serviceable planes at these points are to be kept in hangars under guard of four or five men in charge of a sergeant.

Montauk Naval Air Station Abandoned

Montauk Point, Long Island.—The Montauk Naval Air Station, which was built here at an expense of several million dollars, was closed officially at 5:02 P. M. on August 4, when the flag lowering ceremony took place for the last time, and its building and machinery soon will be scrapped.

Abandonment of the station had not been expected so soon, and until recently mechanics had been at work there to complete the dirigible C-6, sister to the C-5. The C-6, which was almost ready to fly, is to be disassembled and shipped to Santiago.

60 Per Cent. of Air Service Contracts Liquidated

Washington, D. C.—According to a statement prepared by the Statistics Branch of the General Staff on August 6, $288,170,000 of the $480,598,000 of Air Service contracts outstanding at the end of the war have been liquidated. This represents 60 per cent of the entire amount.

To secure the liquidation of these contracts payments totalling $64,511,000 were required, or 22 per cent of the total liquidation. Thus a saving of 78 per cent has been made.

36,000 Miles of Army Cross Country Flights in Week

Washington, D. C.—The mileage flown by Army aeroplanes in cross-country flights for the week ending August 2 was 36,399. This figure does not include the mileage devoted to the instruction of enlisted men, of whom twenty-nine have already qualified as pilots.

First Enlisted Man Pilots an Aeroplane Over the Sierras

Reno, Nev.—Sergeant T. J. Buckley, in Curtiss JN6-H, made a flight from Sacramento to Calneva, 195 miles, in 108 minutes; Calneva to Reno, 65 miles, in 48 minutes, at an altitude of 14,000 feet. He is the first enlisted man to fly over the Sierra Nevadas.

Problems in Wood Propeller Design

(*Continued from page* 1054)

as metal, these materials are being used very satisfactorily in ordinary work. In applying fabric coverings, that portion of the blade tip which is to be covered is first tooth scraped parallel with the grain to form a good surface to which the glue will adhere. Then the surface is coated with a glue sizing material, the dampened fabric being also given a glue sizing coat at the same time. Then, beginning at the leading edge, the non-working face of the blade is covered with the fabric, all irregularities or ridges being worked out by the fingers until a good, smooth surface is obtained, the fingers being moved from the leading edge to the trailing edge.

Then by using a small rounded stick, all air pockets and excess glue is worked out, starting at the center and working toward the edges. Next the fabric is ironed down carefully with a hot iron to absolutely insure uniform adhesion of the cloth all around, and to eliminate any trace of puckering, formation of air pockets, etc. With the trailing edge covered, the fabric is trimmed flush with the leading edge, and when the blade is turned over for the application of the fabric to this side in the same manner, an overlap on the non-working face at the leading edge is made. This should be about ½ inch wide.

This tipping process is done before any of the finishing varnish or filler is applied to the propeller, and with the fabric in place, the next thing is to proceed with the application of the filler to the non-tipped portion, after which the fabric is given two coats of aeroplane dope, twenty minutes to an hour being allowed between the application of the two coats. A light sanding of the doped fabric comes next, when the entire propeller is ready for its final finishing with spar varnish.

As already brought out, the fabric tip is not advisable for other than land machines. Such ships are rarely exposed in regular service to such severe conditions but what the linen covering will afford sufficient protection to make their use advisable when the great simplicity of putting on such tips is taken into consideration. Besides affording good protection against abrasion of the leading edges, such tips act as a sort of binding that in most cases holds the fibers of the wood together at high speeds. In this they have a great advantage over metal, for being very light and there being no holes in the wood, the centrifugal forces and splitting action of metal sheathing is overcome.

Fabric tips are not much protection against water spray, as tests and service have shown. It soon wears the fabric completely off the leading edge, although not disturbing that part of it on the faces themselves. But for ordinary mist, flying particles, pebbles, etc., it is safe to say that the fabric tip affords enough protection to warrant its use in preference to other tips, all things considered.

Pig Skin Covering

This method of tipping, as might be expected, is the next thing to metal when it comes to protection against long grass, sand, gravel, wet grass, and the like. It will take care of the propeller blades even when subjected to water spray, where the water is not of too long a duration, and in many instances has proved very satisfactory where a plane had to be out in rain.

There is no doubt that properly applied pig skin, with its known wearing qualities, acts as a strengthening agent for the wood, preventing the fibres from pulling apart when the stick is subjected to high speed. In fact, in many tests pig skin-tipped blades have withstood high rotative speeds for long periods without showing any sign of failure. This material is, however, harder to apply than fabric, and for general all-around conditions it is a question whether or not it possesses enough advantages over linen or cotton to warrant its use in preference. Planes that have to do a great deal of night flying or those operating in wet or damp regions, though, would best have propellers with tips of this material in preference to fabric, for reasons above brought out.

Other Methods of Tipping

Various other schemes and materials have been put forth for propeller tipping, but none of these have as yet shown results that are the equal of fabric or pig skin when all advantages and disadvantages have been weighed. For instance, celluloid, hard rubber, zinc and aluminum spraying and composition coating have been tried with varying degrees of success.

Celluloid coverings might at first thought seem very advantageous, but in tests it was found that this material, due to its shiny texture, gives off a reflection that is very objectionable to the pilot. The sun's rays cause it to make a glare that is dangerous in its blinding action upon the occupants of the plane. Being a brittle material also, it is easily cracked unless of a goodly thickness, which means weight.

Hard rubber deposited over the surface has not matched up to expectations of those who thought this would be the solution of the problem. Of course, from the strength standpoint, rubber would not be considered, but it was primarily intended as protection against stones, pebbles, etc., as well as being impervious to moisture. But it chipped very easily in tests, and has been discarded.

Sprayed metal would seem to have possibilities, although very little development work has been done along this line. It has shown itself, in what tests have been made, to be very good protection against flying particles and rain drops and spray, as well as tall and wet grass. However, as it is much harder to apply than most other coatings, some simpler methods than now used would have to be worked out before it could be considered practical, and it is a question whether the effort is justified.



A view of Parkwater—the excellent 500 acre Aviation Field at Spokane, Wash.

FOREIGN NEWS

Non-Stop Flight from Madrid to Rome

Rome.—Aviator Stoppani, piloting an aeroplane from Madrid to Rome, arrived on August 6 at 5:45 P.M. He left Madrid at 6 A.M. of the same day.

The flight was made without stop, by way of the Gulf of Lyons, Marseilles, Spezia and Pisa.

The aviator carried a letter from King Alfonso of Spain to King Victor Emmanuel of Italy.

First Flight Over Canadian Rockies

Lethbridge, Alberta.—Captain E. C. Hoy made the first flight over the Canadian Rockies in a flight from Vancouver, B. C., lasting over 14 hours. He took off at 4:15 A.M. and arrived at Lethbridge, about 500 miles distant, at 6:22 P.M.

Aircraft to Compete with Cables

Mr. G. Holt Thomas, organizer of the Aircraft Manufacturing Co., in a paper before the London Society, read an instructive paper on "London and Its Future Aerial Transport." Mr. Thomas outlined the importance of London as an air traffic center. Regarding the London-Paris aerial traffic, he said that it cost 2d. per word to send a telegram from London to Paris. Assuming that it cost £120 to fly from London to Paris, and taking one of his own machines, which was to-day used on the military service between London and Paris, they could carry (he was quoting General Sykes) 672 lbs. of matter. Assuming such a low weight as 2,000 words per ounce—he thought it could safely be put at 5,000—the number of words carried would be 21,500,000, which worked out at so low a figure that one could hardly talk about the price per word. As the calculation would show, they could carry words at 700 a penny.

The same calculation showed one—and this was a subject which they had been specially studying—how the telegraphic and telephonic communication of this country could be linked up with the telegraphic and telephonic services of another country. There was another reason for talking chiefly of mail and matter, as compared with passengers—viz., the expense. Suppose it cost 10s. a mile, or £120, to fly to Paris, carrying two passengers. The price of £60 was almost prohibitive. But consider the weight, say, of two 11 stone passengers as made up of half-ounce letters, and the situation was completely changed. The two 11 stone passengers equalled 9,856 letters, and at the same price per trip, the transport of the letters cost about 3d. each. The charge would, of course, have to be much higher because one would not get 10,000 letters to deliver. Also a special form of collection and delivery would have to be arranged for, as it was no use flying from London to Paris in two hours and taking four more to deliver letters to their destination.

King George, Chief of Royal Air Force

London, Aug. 1.—King George has assumed the title of chief of the Royal Air Force. New titles for the commissioned ranks in the air force have been given by King George, namely, Marshall of the Air, corresponding with a Field Marshal; Air Chief Marshal, corresponding with General; Air Marshal, corresponding with Lieutenant-General; Air Vice-Marshal, corresponding with Major-General, and Air Colonel-Commander, corresponding with Brigadier-General.

The idea in giving the ranks is to preserve the independence and integrity of the air force as a separate service. The titles will come into operation immediately.

Berlin-Munich Airship Service

Berlin.—Zeppelin airship service between Berlin and Munich will be inaugurated in the near future, says the Vossische Zeitung. Flights will be made regardless of weather conditions, and it is expected that the journey will be covered in seven hours. The fare will be 300 marks (normally $753.

Brazilian Government to Finance Transatlantic Flight Preparations

Rio Janeiro.—A prize of $1,500 for the first Brazilian or Portuguese military aviators to fly between Lisbon and Rio Janeiro is proposed in a resolution introduced in the Chamber of Deputies. The measure calls for the Government to finance preparations for the flights up to an amount not exceeding $150,000. It is provided that the flight shall not require more than 168 hours.

The Portuguese Government on June 6 offered a prize of 30 contos (approximately $32,400) for the first Portuguese or Brazilian aviator to fly from Portugal to Brazil.

R-80 to Start Passenger Service Between London and Brazil Soon

London.—*The Daily Graphic* says that the first passenger airship is due to sail from Barrow-in-Furness to Rio de Janeiro some time during August. Twenty passengers and a small cargo will be carried aboard the vessel, which will be fitted out with all the luxury and comfort of an ocean liner.

The airship will fly by way of Lisbon, Sierra Leone, and thence to Rio. The anticipated flight will take about four days each way, and if successful will be the prelude to a regular service, which will be maintained by Vickers.

Sir Woodman Burbidge has booked three berths for himself, his wife, and a friend for the round journey to Rio and back. The price of the tickets was £1,000 apiece.

The R-80, as the airship is now known, has been under construction at the Vickers Barrow works for some months. She was commissioned by the Admirality last year, with the object of producing a rigid British airship of medium dimension which would give the same performance as the latest German Zeppelin.

She has a capacity of 1,250,000 cubic feet, or rather more than half the size of the R-34. She has a cruising speed of forty-six miles and a full-power speed of sixty miles an hour, and is 535 feet in length.

The passengers' living quarters are on the top of the hull, where are situated a large saloon fitted out like a Pullman car, a roof garden, and a shelter deck, and cabins of sleeping berths.

Five Motored German Aeroplane Falls Carrying Gold to Ukraine

Berlin.—A special despatch to the *Lokalanzeiger* from Rybnik, upper Silesia, says a large German aeroplane belonging to a German airship works fell on August 4 during a flight, killing seven of its occupants, including the pilot, Bindereif.

The accident occurred near Ratibor. The aeroplane carried 3,000,000 rubles in Ukrainian money and a sack of Russian money. The despatch says it is probable that former Finance Minister Witousky of the West Ukraine Republic, who attended the Peace Conference and later visited Berlin for a few days, was a passenger.

Bolivia Employs American Officers to Build Up Air Service

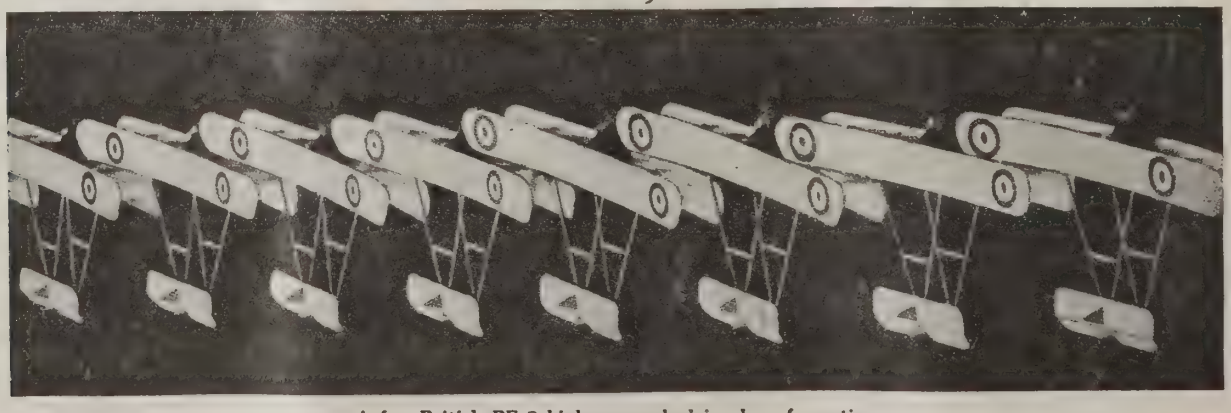
Captain Donald Hudson, formerly a member of the first pursuit group of the American Expeditionary Forces in France, has been employed by Bolivia to organize and instruct a flying corps in its army. It is said that Bolivia had decided to secure instruction for its army by discharged American officers after it had failed to secure admission of picked cadets to the West Point Military Academy. The American Government is unable to accept more foreign students at the American school.

Aviator Makes Non-Stop Flight From Santiago to Buenos Ayres

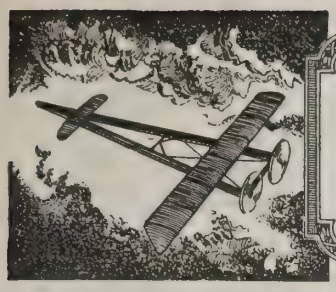
Buenos Ayres, Argentina.—In making his non-stop aeroplane flight from Santiago, Chile, to this city on August 5 in 7 hours and 10 minutes. Lieutenant Locatelli, the Italian aviator, averaged approximately sixty miles an hour. His greatest altitude was about 17,500 feet.

British Aircraft Maker Reached Quantity Production in Quick Time

London.—The record of Ruston, Proctor & Co., Ltd., of Lincoln, in reaching quantity production despite war labor conditions and the necessity of constructing factories and training unskilled workers is an enviable one. Ruston's signed their first contract with the War-office for the supply of aeroplanes on January 15th, 1915. Before the work could be undertaken a factory had to be built. For this purpose three bays of shedding formerly used for the storage of thrashing machines were taken over and on the adjoining ground—originally a marsh, if we remember aright—further accommodation was erected. The workpeople—many of them girls—had to be trained, but in spite of all difficulties the first aeroplane was completed and accepted by July 15th, 1915, exactly six months from the signing of the contract. Soon afterwards the firm was producing an average of seven or eight complete aeroplanes a week and engaged on aero engine work as well. The thousandths aeroplane—a Sopwith camel, it is stated—was turned out on January 4th, 1918. According to an announcement recently made, Ruston and Hornsby, Limited, as the firm has now become, will, when its war contracts for aircraft have been completed, have delivered 2,725 complete aeroplanes and 3,200 complete aero engines, together with the spare parts for 800 other engines. The first aeroplane built by the firm was of the B.E. 2 d type and the fourth is said to be the one used by Lieut. W. L. Robinson in destroying the Ruffley Zeppelin on September 3, 1916.



A few British BE-2 biplanes parked in close formation



ELEMENTARY AERONAUTICS and MODEL NOTES

By John F. McMahon



THE ILLINOIS MODEL AERO CLUB HAS MADE A CLEAN-UP IN THE CONTESTS FOR THE AERIAL AGE AND VILLARD PRIZES

THE Illinois Model Aero Club has made a clean-up in the model contests for the AERIAL AGE prizes, as well as winning the Henry S. Villard Trophy for the third and final time.

Although many clubs throughout the United States competed for the rich prizes offered, none made the showing that this club did. Their records are something to be justly proud of and each member of this studious and growing club should be congratulated.

The Aero Science Club of America and the Pacific Coast Model Aero Club were completely outclassed by their friends in Chicago and their only soothing salve is the fact that they will have a chance to turn the tables at a later date.

The results of the Illinois Club's contest are really wonderful in view of the fact that most of the older members are advanced above the model stage and are devoting their time to the large machines. This leaves the field open to the latest members, who have shown that they have the makings of real champions in model aeroplane flying.

You would think that they would be satisfied to win the beautiful Villard trophy and call it a day's work. No, not these young conquering heroes; they believe that anything half done is not done at all, so they went out to win all or none, and they sure have done their work well.

This should not deter the other model flyers throughout the United States; in fact, it should be an inspiration, as it is just as easy for you to be successful in the game if you devote your time and energies to the intricate construction and design of a successful long-distance racing model. Many designs of racing models have been shown on this page and any of them are capable of travelling 2,000 feet or over with a little practice.

The secret in long-distance racing is to have a light model with large wing surface, large diameter propellers and just enough rubber to turn the propellers about 800 r.p.m. These models float more than they fly and very little propelling force is needed to push the model through the air. In the near future we will again illustrate and describe a long-distance flying model.



The Henry S. Villard Cup which is now the property of the Illinois Model Aero Club

The winners of the Rising from the Ground Contest for the AERIAL AGE prizes, namely, the Gold, Silver and Bronze medals, which were shown on this page some time ago, are as follows. (Winners, distance, club and prize):

Schweitzer, 1,805 feet, I.M.A.C., gold medal.
Lucas, 1,447 feet, I.M.A.C., silver medal.
Jaros, 1,273 feet, I.M.A.C., bronze medal.

The Long Distance Model Contest winners are as follows:

Schweitzer, 2,778 feet, I.M.A.C., gold medal.
Pease, 2,410 feet, I.M.A.C., silver medal.
Jaros, 2,108 feet, I.M.A.C., bronze medal.

The Villard Cup was won by the following team. (Name, total and average):

Schweitzer .....5,369 feet
1,789 2/3 feet
Cook, 5,240 feet, 1,746 2/3 feet.
Jaros, 5,023 feet, 1,674 1/3 feet.
Pease, 4,959 feet, 1,653 feet.
Lucas, 3,739 feet, 1,246 1/3 feet.

The beautiful AERIAL AGE Cup for the best constructed scale model of the flying or non-flying type was won by Henry Smalline, of 227 Lewis Avenue, Brooklyn, N. Y. His model was an exact copy of the little Berkmans scout and is indeed worthy of this beautiful prize.

More contests are to be held in the near future, and I would advise the readers who do not get AERIAL AGE regularly, or who have to depend on some newsdealer supplying them, to subscribe for the paper, if only for six months. Special offers regarding subscriptions can be had by applying to the Subscription Department.



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Everything is Going Up

Caller: "It's a good thing to teach your boy the value of money, as you are doing."

Host: "Well, I don't know. He used to behave for ten cents, but now he demands a quarter."—*Boston Transcript.*

A Model for the Aircraft Industries

"How did Solomon get his great reputation for wisdom?" queried Mr. Meekton's wife.

"Oh, I am sure, Henrietta, it was not through anything he thought up for himself. You know he had a great many wives and he probably listened carefully to all their advice."—*The Watchman-Examiner (Philadelphia).*

Join the Air Service

"Rastus, why doan you-all jin de Navy 'sted of de Army?"

"G'way fum here, niggah. Ah kin run fastah den Ah kin swim, and Ah can drop fastah than Ah can run."—*Mutual Welfare News.*



EQUATION

She—"Would you call his doing the figure eight higher mathematics?"
He—"Yep. Plane geometry."

—Philadelphia Evening Bulletin

The American Eagle

Blue spreads the sky above me
Gently blows the western wind,
I trundle the little "pursuit" out
And closely tuck me in.

The "Liberty" hums a merry tune
Seeming eager to be off,
I gently wave the "mechs" aside,
And swiftly soar aloft.

Below me spreads the countryside
With camp and village, hill and mead,
I note the river's silvery thread,
And softly guide by flying steed.

This is the life for bird and man,
My soul exultant is and glad,
While, unbidden, memory conjures up,
The magic carpet of Bagdad.

Swiftly above the clouds we rise,
My willing steed and I
And on the sheeny, fleecy things
We look down from on high.

Again we view the landscape o'er,
'Tis Mother Nature's lap,
And wrest the very secrets from
That ever changing map.

The trench, the gun or tortuous road,
The wood or farmhouse grey,
I fix their menace or harmlessness,
Then quickly speed away.

I sit and dream of fairy tales
Of Pegasus' wonderful horse,
Of twenty-league boots or flying chests
And they're a matter of course.

I travel far on wings of winds
I see all the wondrous sights
That gladdens the American Eagle's eye
Or dwell in Arabian Nights.

Oftimes the bursting shrapnel shells
Like pursuing Trolls come after
But soon we maneuver out of reach
Or pass them by with laughter.

Sometimes we meet the dragon foe
And by vrille or baffling loop
We elude his deadly fiery breath
And swiftly on his tail we swoop.

Then when the day is ended
And the golden red is dyeing he west
We gladly circle homeward

H. F. Greaves, A.E.F.



THE AEROPLANE IN AFRICA

Giraffe—"Here, you, be careful where you're going. The next time you hit me in the neck I'll bite you."

—Philadelphia Evening Bulletin



LET US BUILD THE HOUSE FOR YOUR "SHIP"

Baker hangars met the exacting government requirements. We have been making quality canvas products for fifty years.

We also make: CLOSE FIT COVERS, FUSELAGE COVERS, COCKPIT COVERS, PROPELLER COVERS, ENGINE COVERS, LIFE BELTS and a full line of airplane accessories. Write for particulars.

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New York:
473 Kent Ave., Brooklyn

(*Continued from page* 1044)

in conference appears an extraordinary similarity in condition and in conclusions drawn from the experiences of the five difficult years of mistake and achievement in the prosecution of the war. Perhaps no stronger or more simple presentation of the regard in which the future of aviation is held in allied countries can be given than by quotation from two letters of M. Clemenceau, copies of which were obtained in France. The first is addressed to the President of the United States, urging upon him the immediate consideration of matters aeronautical and in connection with the Peace Conference. The second is addressed to the President of the Republic of France, submitting the draft of a decree creating a separate department of aeronautics placed transitorily under the Ministry of War—an intermediate step possible without legislation and looking to the early creation of an independent Ministry of the Air:

FEBRUARY 16, 1919.

The President of the Council, and
The President of the Interallied Peace Conference.
To the President of the Republic of the United States.
Interallied Aviation Committee:
Mr. President:

I have the honor to acknowledge the receipt of your answer of February 7 to my letter of January 24. I enclose herewith copies of the letters which I have received from Lord Milner and from Monsieur Orlando, as well as my replies.

I am pleased to note that you agree in principle with my proposition to create an aviation committee for after the war. I take the liberty of insisting o nthe necessity of creating this committee without delay, in order to be able to utilize it as an advisory organ for the Peace Conference. Indeed, the clauses for aerial protection seem to me to have at least an importance equal to the clauses for military and naval protection, and it is of the greatest interest to have a study made by competent personalities of the measures to take against the eventual constitution of a German military fleet. I cannot insist too strongly on the imperious necessity of this study, on account of the proximity of Germany to London, Brussels, Paris and Rome.

Likewise, I adhere entirely to the British proposition, which seems to be practical and effective, and I request you likewise to give it attention. In case it seems acceptable to you, I wish you would let me know if you could delegate two representatives to the next meeting of the new Interallied Committee, which will take place on Thursday, March 6, at ten o'clock, at the Directory of Aeronautics, 260 Boulevard St. Germain.

Please accept, Mr. President, the assurance of my highest consideration, etc.

(Signed) CLEMENCEAU.

REPORT TO THE PRESIDENT OF THE REPUBLIC.

PARIS, June 6, 1919.

Mr. President:

Aircraft has developed considerably during the war. It should at this time adapt itself to a no less important part in peace time. But because of the many initiatives which cooperate in its new use and development the efforts and means are dispersed in various ministerial departments.

The future of aviation in France will only be assured by the coordination of all efforts and the unification of the general services. Also, it will give the advantage of better work from the personnel and credits which are actually effected to similar objects in different ministries.

With this object in view, and according to the propositions of an interministerial conference which I am able to assemble, I have the honor to submit for your signature the following decree creating an organ of general coordination of aviation.

This should not be confused with any of the particular aviations of the various ministerial departments. At its origin it will be attached transitorily to the Ministry of War.

I am, sir, yours respectfully,

GORGES CLEMENCEAU,
President of the Council, War Ministry.

Even before the report of this Mission can be given consideration a step similar to that proposed by France will have been taken by Italy. Here, however, the Department of Aeronautics is being placed under the Ministry of Transportation —a makeshift arrangement frankly acknowledged transitory and immediately possible without the legislation needed to create the clearly foreseen ultimate—the Italian Ministry of Air.

England more than two years ago began the coordination

(*Continued on page* 1067)

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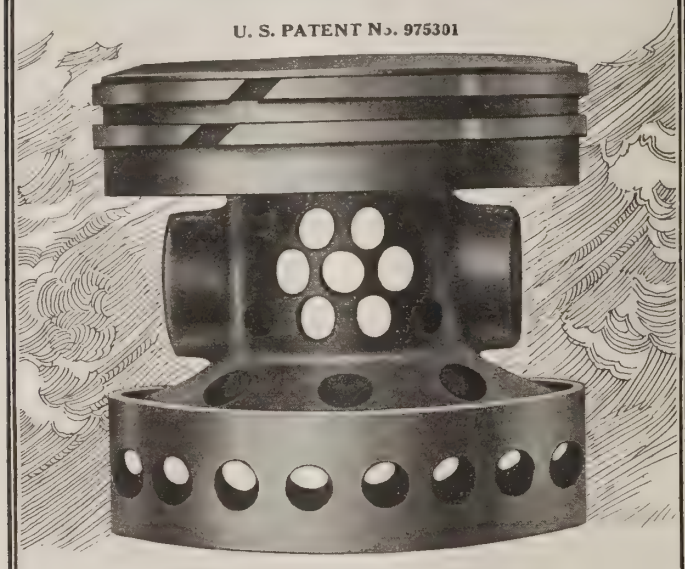
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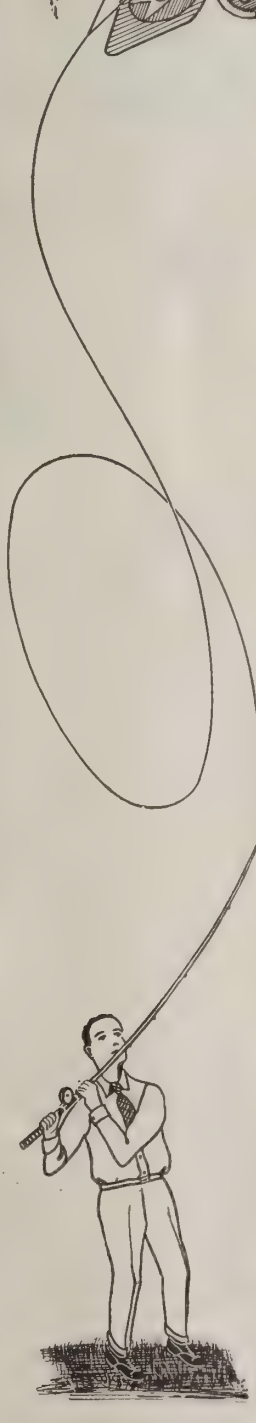


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(*Continued from page* 1047)

accompanying drums and springs, are housed or concealed within the space between the fueslage frame and side sheathing (19) of the fuselage, which is spaced therefrom and curved to give the desired streamline contour. The bottom wall of the sheathing (9) is provided with a longitudinal slot or opening at each side of the fuselage frame, as indicated in dotted lines at A, A in Figure 1 to receive the members (2) and permit the members (10) to pass upwardly inside the sheathing when the chassis is folded or retracted, and likewise said bottom sheathing has a transverse opening and a diagonal opening covered by channel members forming recesses or chambers to receive the chassis frame members (3) and (6), respectively. A filler plate (20) or closure is provided for each opening in the sheathing and each plate is normally projected by springs (21) when the pocket is empty to afford a substantially flush continuation of the skin or sheathing (9) across the pocket mouth, the filler being pressed back into the recess as shown in Figure 4 when the chassis frame is drawn up as indicated in dotted lines in Figure 2. Furthermore the cross sectional shape of the members 2, 3 and 6, of the chassis frame, as clearly indicated in Figure 4, is such that the lower surface (22) thereof is substantially flat and likewise forms a substantially flush continuance of the surface (9) when the chassis is retracted, so that the wind resistance is thereby minimized. As a further detail of construction the exterior sheathing may be so positioned as to envelop the wheels when the device is retracted, while at the same time the lower rim of the wheel is in place where it can act as a support.

As a result of this construction, an alighting device is had that is completely concealed with the exception of the bearing wheels within the fuselage when the machine is in flight and that when extended offers minimum wind resistance because of the single bracing member and the cross sectional contour of the parts while the springs are positioned to minimize the stresses encountered by the device when the machine encounters the ground. All the weight of the machine is communicated almost directly to the wheel through the vertical struts without appreciable effect on the frame that the wheels are mounted on, so that the latter cannot tend to materially distort the frame and the same can therefore be made extremely light.

War Department Moves to Protect Its Inventions

Washington, D. C.—The War Department authorizes publication of the following information:

It has come to the attention of the Secretary of War that inventions relating to military affairs made by those in the military service of the United States and in the discharge of their official duties are not being patented by inventors, but by certain contractors, who embody these inventions in supplies to the Army after obtaining patent in their own names, and are collecting royalties for same.

The above action is illegal and has resulted in material loss to the Government. All heads of departments, chiefs of bureaus or other agencies of the War Department having to do with the making and enforcement of contracts, are directed to consider Act of July 1, 1918, which amends Act of June 25, 1910, which extends remedy afforded patentees by suit in Court of Claims for compensation for use of their inventions.

The heads of departments, bureaus, etc., are directed to take necessary steps to protect the Government by assisting employees to establish their rights to inventions, making full reports of the facts in each case.

The transfer of the Inventions Section from the War Plans Division to the Operations Division is completed by a general order soon to be published to the Service. Hereafter, communications, re, inventions, including suggestions, ideas or plans of operation submitted to the Government for inspection, test or sale, received from any source, including the public, and any office of the War Department, staff, corps, supply depot, or any headquarters of military establishment will be referred directly to "The Inventions Section," Operations Division, General Staff, Washington, D. C. All men belonging to the service who have ideas for improvements in any of the materials, are notified to submit descriptions freely.

It is also directed that hereafter all communications re, rights to inventions and patents originating in military service other than Staff Corps and Supply Bureaus, be forwarded to Patents Section, Purchase Branch, Office of the Director of Purchase, Storage and Traffic Division, General Staff, Washington, D. C., except communications re, inventions or devices submitted to the Government for inspection, etc., from a technical standpoint, received in the War Department, shall be referred to Inventions Section, Operations Division, General Staff, Washington, D. C., as heretofore.

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FIRE—AUTOMOBILE—TORNADO—EXPLOSION—RIOT AND CIVIL COMMOTION

(*Continued from page* 1063)

of her aircraft activities—an effort which has resulted in placing her well in the lead in practically every phase of aerial development, and which has resulted in bringing her months ago to the establishment of a Ministry of Air, co-equal with her Ministries of War and of the Navy. That the present Ministries both for War and for Air centered in the same individual has no significance other than that of momentary expediency.

The whole trend of events touching the art of aeronautics in its broad relation to world progress, the experience in all allied countries (including the United States) during the five years past, the frankly discussed future plans under present consideration in foreign quarters and the views everywhere encountered by us, leave your Mission impressed with these unescapable conclusions:

1. That Italy, France and England realize fully the importance of aircraft in the military-naval and civil-commercial aspects, and purpose to encourage the general development of the art through governmental aid to commercial industry.

2. That Great Britain has come to consider the dominance of the air as at least of equal importance with that of the seas, and in frankly and avowedly planning a definite policy of aerial development to that end.

3. That any future war will inevitably open with great aerial activity far in advance of contact either upon land or sea, and that victory cannot but incline to that belligerent able to first achieve and later maintain its supremacy in the air.

4. That for economic reasons no nation can hope in time of peace to maintain air forces adequate to its defensive need except through the creation of a great reserve in personnel, material and producing industry through the encouragement of civil aeronautics. Commercial aviation and transportation development must be made to carry the financial load.

5. That no sudden creation of aerial equipment to meet a national emergency already at hand is possible. It has been proven within the experience of every nation engaged in the war that two years or more of high pressure effort have been needed to achieve the quantity production of aircraft, aircraft engines, and accessory equipment. The training of personnel, including engineering, production, inspection, maintenance and operating forces—covering some fifty distinct trades and some seventy-five industries—has proved in itself a stupendous task when undertaken upon the basis of the war emergency alone.

6. That the rapid adaptation of aircraft to the commercial uses of peace is everywhere being studied and planned. Under the forced draft of war, this newest and fastest agency of transportation has been brought to a high state of development. It must now be redesigned to meet the progressive demands of a civilization at peace.

7. That because of its great speed and range of operation, oceans, states, and even countries, are being passed over with a greater facility than are townships and counties traversed by the motor car. The need for international agreements governing the construction, operation and safety of aerial apparatus of all kinds is immediately before us.

8. That for the first time in the world's history the stage is set for a close international cooperation in the development of a great art at the very threshold of its era of commercial utility. Great Britain, France, Italy and Japan not only invite but urge the United States to share in this work.

9. That just as we now have national, international and interstate regulations, laws and agreements covering rail and steamship travel, and the safety and navigation of the seas, so must we have similar regulations governing aircraft and the uses of aerial navigation throughout the world. The International Convention drawn by the International Committee sitting in Paris under the Peace Conference, gives the first long step in this direction.

10. That the need in each country for a single authoritative point of contract for the conduct of all international aviation affairs, legal, operational, technical and political, is imperative. Such agencies have already been set up in England, France and Italy. The United States has under the terms of the International Convention no option but to follow these leads.

11. That in England, France and Italy sentiment is undoubtedly in favor of the centralization of aircraft development under one authoritative head. Difference of opinion has been encountered only in the matter of Army and Navy personnel and in the question of the independent fighting force.

England holds the initiative and is building her Royal

(*Continued on page* 1068)



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(*Continued from page* 1067)

Air Force co-equal with the Army and Navy. France and Italy follow England's lead, but seem inclined to leave questions of operating personnel for the present to War and Navy Departments, and to debate the need of an independent fighting air service. In all cases, forces operating in conjunction with military and naval units function under the military or naval high commands.

12. That among the many considerations of early moment requiring governmental direction may be mentioned the following:

(a) Federal and International laws governing the use of air routes.
(b) Federal and International control of pilots' licenses; examinations and tests required.
(c) Federal inspection of all commercial aircraft for airworthiness, or suitability for service.
(d) Customs and other regulations for cross State and National boundaries.
(e) International standards for methods of communication and signaling.
(f) International standards covering the marking or charting of air routes and of landing places for both day and night use.
(g) International specifications and rules governing the construction, equipment and operation of standard aerodromes, landing stations, signal towers and other aids to aerial navigation.
(h) Port regulations and fees covering seaplantes.
(i) Federal taxation of aircraft and license for its use.
(j) Safety measures and devices; legislation forcing adoption.
(k) Fire underwriter standards, regulations and safeguards; insurance of machines, of material and of persons in transit (property and life).
(l) The legal status of privately owned aircraft; the property rights of the air; liability for damage inflicted and incurred.
(m) International standards and specifications covering accepted practice in quality of materials, in factors of safety, and in methods of construction; an engineering literature of this new art must be created by International approval.
(n) Maps and navigation charts of the United States and its territories.

13. That we of today are conceivably no more qualified to judge as to the scale and development of the aircraft of ten years hence than were we of even five years ago able to foretell the achievements of today. We must bear in mind always that for every one mind focused upon things aeronautical in this earlier period, some thousands of keen minds are now versed in the aircraft art. With proper governmental encouragement, rapid progress seems inevitable.

14. That the broadest consideration for the ultimate welfare of American aviation must be given in the constitution of any organization set up for the co-ordination and control of aeronautics within the United States. The prerogatives and ambitions of governmental departments and of individuals must be assayed at true value.

15. That past experience and every economic consideration point to the vital need for the formation by the United States of a definite, comprehensive and continuing policy for the development of every phase of the aircraft art. Our Government is now faced with the task of nursing and actively encouraging a new transportation industry, whose healthy growth is vital to the future progress and defense of the nation.

Because of the lack of a definite, intelligent and sympathetic policy in our governmetal aircraft organization since the armistice, our American aeronautical industry, built up at such great expense of money and of effort, is rapidly disappearing. No sensible business man is justified in keeping money invested in the aircraft industry under the conditions which have maintained in the United States since November 11.

16. That the closest possible relations must continually exist between the aircraft agency of the Government and the production and commercial industry engaged in aircraft development.

17. That the industries involved in the production and commercial use of aircraft must be given recognition and representation in connection with all national and international activities bearing upon the direction and control of aeronautics.

(*To be continued*)

AUG 25 1919

AERIAL AGE WEEKLY

Vol. 9, No. 24 AUGUST 25, 1919 10 CENTS A COPY



An Aerial View of the National Capital

Trans-Continental Aerial Derby Being Organized by Aerial League

PUBLISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY



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VOL. IX NEW YORK, AUGUST 25, 1919 NO. 24

TRANSCONTINENTAL AERIAL DERBY BEING ORGANIZED BY AERIAL LEAGUE

OVER $100,000 IN PRIZES

PLANS for a Transcontinental Aerial Derby, from New York to San Francisco, with over $100,000 in prizes, with a first prize of $20,000, have been announced by Captain Charles J. Glidden, the Chairman of the Aerial Touring Committee of the Aerial League of America, and donor of the Glidden Aeroplane Efficiency Trophy.

The Transcontinental Aerial Derby will be held under the auspices of the Aerial League of America and will be sanctioned by the Aero Club of America under the rules of the International Aeronautic Federation, which govern all aerial sporting events.

The Derby will be international in character and will afford a supreme test to the aeroplanes and motors entered.

So as to test the efficiency of different types of aeroplanes for touring and everyday transportation, and create maximum public interest in the contest, the race may be in legs of 250 miles each, with a compulsory stop at the end of each leg.

If this rule is adopted there may also be offered a $20,000 prize for a non-stop return race to be confined to the aeroplanes which can be proven theoretically to be capable of carrying the amount of gasoline required to cross the continent without stop, with 500 pounds of mail.

This is to be decided by a committee of aeronautic experts who will consider the matter from a practical standpoint. This committee will also define the handicaps to be placed on different classes of planes.

It has been proposed that the results in this contest be figured by the point system, allowing points for the records made by each aviator for each leg of the race. This will give equal chances throughout the contest to all the aviators.

The United States Army, Navy and Aerial Mail aviators will be invited to participate in the Derby. Captain Glidden will go to Washington to interview Army, Navy and Postal authorities, and extend them the invitations to participate.

The date of the Derby will be announced after conferring with the Washington authorities, aircraft manufacturers and owners of aeroplanes.

A committee is to be appointed by Rear Admiral Robert E. Peary, the President of the Aerial League of America, to have charge of the work of establishing landing places at intervals of fifty miles across the continent, along the Woodrow Wilson Airway.

FUTURE OF AERIAL TRANSPORTATION IS TREMENDOUS, SAYS FRENCH AUTHORITY

FIGURES regarding the tremendous interest existing in civilian aviation all over the world were given by Monsier Maurice de Saint Blancard, the Secretary of the Aero Club of France, and one of the highest aeronautic authorities, who arrived on "La France" and is the guest of the Aero Club of America at the clubhouse, No. 297 Madison Avenue.

M. de Saint Blancard stated that European countries are planning extensive aerial mail lines, and that France, England, Italy, Belgium and Spain are planning to establish aerial mail and aerial transportation lines to their African colonies.

"Successful flights have been made," said M. de Saint Blancard, "from France to Africa, from Italy to Africa, from England to Africa and to India, and have demonstrated the practicability of establishing aerial lines which will be economically practical besides cutting down the time of transporting mail and express to one-quarter of the time required by land and water transportation. Practically all the French, British and Italian manufacturers have produced aeroplanes fitted with cabins which permit air travel with comfort."

There is going to be, also, the employment of large dirigibles for aerial transportation on an extensive scale.

Over one million dollars has been offered in different countries for prizes and other aeronautic purposes, as follows:

(1) The British Government is offering prizes amounting to $320,000 for aeroplane competitions to develop safer aeroplanes.

(2) The sum of $400,000 has been given to the Aero Club of France by Henry Deutsch de la Meurthe.

(3) Prizes amounting to over $100,000 are to be offered for the transcontinental competition being organized by the Aerial League of America.

(4) The French newspaper, "Echo de Paris," has given $60,000 for prizes for a 2,500-mile circuit race.

(5) The French newspaper, "L'Avenie," has given $20,000 for cross-country contests.

(6) $50,000 has been offered in prizes to the first Australian pilot who flies from Great Britain to Australia.

(7) The London "Daily Express" has offered $50,000 for aeroplane demonstrations establishing aerial communications on a commercial basis with India and South Africa, the machines entered being required to carry at least one ton of cargo.

(8) A prize of $32,000 has been offered for the first Portuguese or Brazilian aviator who flies from Portugal to Brazil.

(9) A $50,000 prize has been offered by Thomas H. Ince for a trans-Pacific flight.

(10) A $25,000 prize has been offered by Raymond Orteig for the first flight from New York to Paris.

(11) A $2,000 trophy has been offered by Captain Charles J. Glidden for the Glidden Aeroplane Efficiency Tours, to be completed for under rules similar to the Glidden Automobile Tours, which did so much to bring about the use of automobiles for pleasure and transportation.

(12) A $5,000 prize and other prizes have been offered for the international marine flying trophy race, for the best speed over a distance of 200 miles, to be held in England in September.

M. de Saint Blancard stated that a number of long-distance aeroplane and dirigible flights were being planned in Europe, including a flight of 20,000 miles by the famous Italian poet, Gabrielle d'Annunzio, who plans to fly from Rome to Tokio and back.

All the above mentioned contests are to be held under the rules of the International Aeronautic Federation and to be open to all pilots holding the Pilot's Certificate of the Federation, which is issued in the United States by the Aero Club of America, 297 Madison Avenue, New York City, New York.

M. de Saint Blancard states that the Aero Club of France, which holds the International Aviation Trophy, which was won at the Chicago race by Jules Vedrine in 1912, was anxious to hold a competition this year, but found it impossible to organize this competition owing to the fact that no competitions could be held in France prior to the signing of the Peace Treaty.

SANTOS-DUMONT TO HEAD PAN-AMERICAN AERONAUTIC DEVELOPMENT

SEES VAST POSSIBILITIES IN LATIN-AMERICAN REPUBLICS FOR AMERICAN AIRCRAFT CONSTRUCTORS

ALBERTO SANTOS-DUMONT, the famous Brazilian inventor and aeronaut, who built and piloted ten dirigibles and several aeroplanes from 1898 to 1910, has arrived in the United States and is the guest of the Aero Club of America.

Mr. Santos-Dumont returned to the United States from South and Central America, where he has been travelling as Chairman of the Committee on Pan-American Aeronautics of the Aero Club of America, studying the possibilities of aerial transportation.

Mr. Santos-Dumont's report is not yet available, but it is understood he found South and Central America ready for extensive aeronautic development and that everyone of the Latin-American republics are anxiously awaiting the establishment of aerial lines to solve difficult problems of transportation.

It will be recalled that Mr. Santos-Dumont came to the United States from France in 1915, at the request of the Aero Club of America for the special purpose of heading a committee entrusted with the possibilities of establishing aerial transportation in South and Central America.

After studying the aeronautic situation and the possibilities of building larger aeroplanes for nearly a year, he started on his mission, which took him to the different Latin-American Republics. He attended the Pan-American Aeronautic Congress at Santiago, Chile, in March, 1916, where the Pan-American Aeronautic Federation was formed, and where he was made Honorary President. From there he travelled through different countries studying the subject, and when the United States entered the war, and Brazil declared war against Germany, he went to his native country, where he was placed in charge of important aeronautic work in developing the Brazilian Army and Navy Air Services.

The Committee on Pan-American Aeronautics of the Aero Club of America includes Alberto Santos-Dumont, Chairman; Henry Woodhouse, Vice-Chairman; Rear Admiral Robert E. Peary, Captain Charles J. Glidden, Charles Jerome Edwards and G. Douglas Wardrop.

Mr. Santos-Dumont is very enthusiastic concerning the market for American aircraft in our sister republics of the Western hemisphere. He says:

"Only one who is familiar with the economic and sociologic problems of the South and Central American nations can realize what aerial transportation will mean to them, and can understand the tremendous commercial and sociologic development and change to follow as the result of the application of aircraft to transportation. As has been pointed out, building railroads would cost between $100,000 and $200,000 per mile, and years of time, and the subsequent cost of upkeep and maintenance would far exceed the prospective income from countries of such sparse population. On the other hand, the sum of $100,000 would establish an aerial line across a distance of at least 500 miles, or more, where rivers or lakes can be used as landing places for aeroplanes."

While the Pan-American aeronautic movement is youthful, having been conceived by Mr. Henry Woodhouse in 1911 and evolved by him and the other energetic and farseeing men, who are responsible for so many important aeronautic movements—Messrs. Alan R. Hawley, Alberto Santos-Dumont, John Barrett, and Rear Admiral Robert E. Peary—it is advancing in gigantic strides.

The Pan-American Aeronautic movement is based upon the work of pioneers, some of whom were contemporaries of the earliest European experimenters in aeronautics. Brazil, for instance, rightly claims among its pioneers Bartolomeo-Laurenco Gusmao, who takes us back to 1709, and Augusto Severo.

Alberto Santos-Dumont, the Brazilion inventor and pioneer, was the first man to really go where he liked in an aircraft, which he did with his dirigibles in 1901, and the first man to fly an aeroplane outside of the United States, as well as to make a flight in public. He had been a pioneer in cycling and automobiling, and together, spent an enormous amount, probably over a million, in developing cycling, automobiles and aeronautics. In aeronautics he spent over $30,000 a year for twelve years in experimentation. For his substantial support to automobiling he was made an honorary member of the Automobile Club of America.

Australia Appropriates $1,500,000 to Aid Commercial Aeronautics

Australia has noted with interest the development of commercial aeronautics in the countries of Europe and throughout the United States and, feeling that success is assured, has decided to establish a department of her own. For this purpose an initial appropriation of $1,500,000 has been made by the Government and the assurance has been given that more funds will be supplied when the feasibility of commercial aviation in Australia is established. The present appropriation will be used for construction alone, and as the department expands larger sums will be awarded for the purpose.

In returned war aviators Australia has the nucleus for a training corps, for these men are ready to serve their country. They will be asked to assist and direct the construction of the merchant air fleet and to instruct the pilots and observers. The argument is advanced that the returned war fliers will obtain employment in this manner and at a rate of remuneration higher than in other commercial pursuits.

The transport of mail by aeroplane in the United States has been noted here, and the backers of the new movement assert that results in Australia will be greater than in America. In the United States, they point out, there is an excellent system of railroads and the transportation of mails always is speedy, but the aero delivery is faster. In Australia the railroad system is not so good, and the chances for the aero post to better the work of the railroads is infinitely better.

Transportation of passengers in countries of Europe has been the object of interest in Australia and the same argument is advanced that if it is a success there it cannot fail here. Later freight transportation will be taken up, provided, of course, that air delivery of mail and transportation of passengers proves successful.

At present the Government is the only organization interested in the development of commercial aviation here, but later it is expected that private capital will be attracted and that Australia will have a perfect system of aerial transportation for mails, passengers and express.



The News of the Week



Caproni Makes Record Flight from Dayton to Houston

Houston, Tex.—After being delayed for many days until Ellington Field was in suitable condition for landing the three Liberty-motored Handley-Page, a record flight between Dayton and Houston, 1,450 miles, was made in a flying time of 17 hours and 15 minutes. The first Caproni to negotiate this trip took seventy-eight minutes longer to complete the journey. Stops were made at Indianapolis, Belleville, Memphis, Roanoke and Dallas. Heavy rains held the plane for many days at some of these points, so that twenty-eight days were required to complete the flight. One thousand and eighty gallons of gasoline, or an average of 2 gallons per motor per hour, were used in covering the 1,450-mile distance at 84 miles an hour.

Flight Saves Oil Man's $250,000

Wichita Falls, Texas.—William Livingston, an oil magnate, narrowly missed losing $250,000 when he found himself unable to attend a business meeting at Wichita Falls. He received telegraphic advice at Fort Worth to come to Wichita Falls, but missed the last train.

Captain Will Erwin volunteered to take Livingston in his aeroplane. The trip was made at a speed of 119 miles an hour. After the deal was consummated, Mr. Livingston purchased Erwin's aeroplane and hired his services. Since then he has been making his business trips throughout Texas by aeroplane.

New York State Motor Federation Urges Municipal Landing Fields

Utica, N. Y.—According to an announcement made by Mr. John M. Ross, of the New York State Motor Federation, efforts will be made by that body to secure the establishment of municipal landing fields and the establishment of emergency landing places through the cooperation of property holders, as well as the passage of laws to assist aerial travel.

Captured Aviators Held for Ransom

El Paso, Texas.—Lieut. Paul H. Davis and Lieut. Harold G. Peterson have been captured by Villista bandits after a forced landing on Mexican soil, and are being held for a $15,000 ransom. The War Department is complying with the demand of the outlaws.

An official statement was issued by Brigadier General James B. Erwin, District Commander, that Major L. A. Walton commander of the aero unit at Fort Bliss, had received a message from Peterson, advising the payment of the bandits.

Lieut. Peterson was long stationed at Ellington Field, where he became known as one of the most skillful and daring exhibition fliers.

Aeroplane Delivery of Surgical Instrument Saves Patient

Philadelphia, Pa.—In order to save the life of a patient, Dr. Thomas E. Eldridge flew from this city to New York and return recently. Dr. Eldridge found it necessary to obtain a "Caldwell tube," which could only be had in New York. The trip was arranged by Dr. Bert Huyette, president of the Philadelphia Aero Service Corporation, and Paul F. Houser, formerly military aero instructor at Mineola, was engaged as pilot.

Elizabeth Constructs Air Markers to Guide Commercial Fliers

Elizabeth, N. J.—Official air markers for the guidance of airmen piloting passenger and commercial aerial transports of the future over Elizabeth, N. J., will be located in Wilson Park, near the Newark line, it was announced after a conference between Mayor Mravliag, Board of Works Commissioner Hand, Abe J. Davis, president, and Major D. Griffith, secretary of the Chamber of Commerce, and others interested in civil and city improvement.

The air markers as designed are three wooden or concrete structures, thirty feet in length, and will designate Elizabeth as Station J-78 on the air line route. These will serve as guides to direction and identification marks for the air pilots. The park will also be made available to the pilots as an emergency landing field.

New York-Cape May Passenger Service

Cape May, N. J.—A passenger air service between Cape May and New York is being established by D. A. Steele. City officials have given permission for landing the seaplanes of the projected service on the beach. A fare of $100, plus war tax, will be charged.

Aerial Mail Delivered to Adriatic at Sea

New York, N. Y.—The first aerial mail delivery to a ship at sea was accomplished on August 14 when an Aeromarine flying boat dropped a sack of European mail on the deck of the White Star liner Adriatic.

The feat was accomplished successfully in adverse weather conditions by means of an ingenious releasing device developed by the engineers of the Aeromarine Plane and Motor Company. The experiment was an official test undertaken at the request of the Postoffice Department, and may be put into general operation.

Shortly after the experiment, David Lindsay, of the White Star Line, announced the steamship companies would adopt the scheme also for delivery of ships' manifests after the ship has left port. In this manner, he said, fully eighteen hours can be saved to transatlantic liners. The liners will be able to take on cargo up to the last moment before sailing, and then receive the completed manifests by aeroplane delivery long after they have sailed.

The mail delivered to the Adriatic was placed aboard the flying boat at the Columbia Yacht Club on the North River. The mail sack was inclosed in a special waterproof bag.

Piloted by C. J. Zimmerman, the flying boat arose off the yacht club landing and made a speedy flight down the bay. With Zimmerman was his mechanic, Richard Greisinger.

The flying boat overtook the Adriatic just as she was passing out of the Ambrose Channel. After circling around the liner a few times, Zimmerman came down to within fifty feet of the ship's masts and dropped the mail bag.

A steel cable had been stretched between the peaks of the Adriatic's fore and main masts specially for this experiment. On the flying boat a flexible cable, 200 feet long, suitably weighted at one end, had been attached to the mail bag. A special form of shock absorber was included in this cable in order to lessen the tremendous shock expected from the landing of a 100-pound mail sack.

As Zimmerman came down he released the free end of the flexible cable. Then, carefully judging his distance, he drove his aeroplane straight across the ship's course. As the flying boat cut across the liner's bows the cable, which was dangling out at an acute angle in the wind, struck the wire stretched between the ship's masts, instantly becoming entangled in it.

As the aeroplane sped on Zimmerman released the mail bag, which flew out in a straight line until its cable stood out taut. This brought the shock absorbers into play, and they checked the descent with great success. The bag fell into the water alongside the Adriatic, but as the other end of the flexible cable was tightly caught in the steel wire between the masts it was an easy matter for the sailors to pull it aboard.

Immediately afterward Captain J. Ransom, of the Adriatic, sent the following wireless to the White Star Line offices here:

"First aerial mail delivered safely aboard at 2 p. m. Ransom."

Fully 300 passengers crowded around the promenade decks of the Adriatic and watched the experiment. Their cheers echoed down the bay as the bag was successfully hauled aboard.



The U. S. Aerial Mail Boat, which dropped mail aboard the Adriatic several hours after she left port

Airship Service to Link Britain and Central Europe Next Year

The Hague.—Plans for the new era in the aviation world, so long prophesied by the linking up of the whole of Europe by a network of services, are beginning to take concrete form, according to a cable dispatch to the New York *Times*.

Holland, it would seem, is about to become the connecting link between the Allied and Central European countries. The first aviation exhibit in Amsterdam has certainly helped the plans to take definite shape.

Vickers, Ltd., has just announced a combination of passenger and mail services which will help form the links of an aerial chain from England and France through Central Europe. The first service will be between London and Flushing by means of a Vickers flying boat. From Flushing, and in connection with the London service, there will be services all over Holland by Vickers-Vimy commercial aeroplanes to Rotterdam, The Hague, Maastricht, Amsterdam and Northern Holland. There will also be a circuit from London to Paris, Brussels and The Hague.

Another service in the preliminary stages will be started via Arnheim, Germany, to Central Europe, probably connecting with Berlin. There is a possibility that this service will connect with a Zeppelin service beginning at the end of August from Berlin to Friedrichshafen, connecting with Swiss steamboats on Lake Constance and landing at Munich on the way. For this a new type of commercial airship built since the war will be used.

The capital for the network of aviation services will be $5,000,000, partly Vicker's capital and partly taken in Holland. There is little Dutch competition, as the Dutch have practically no airship factories. They had no material for this purpose during the war and even most of the machines for the Dutch Army came from Germany, the parts being put together here.

Complete organization of the new plans is expected to be ready at the beginning of 1920. Handley-Page, Limited, has announced regular service between Amsterdam and London, beginning next week.

The Vickers manager in Holland expressed great surprise that America was not represented at the Amsterdam exhibition.

Taxying Seaplane Beats Fast Motor Boat

Atlantic City, N. J.—Earle Ovington, piloting a Curtiss "Seagull," won out in a surface race against the speedy Nymph II, owned by Louis Eisenlohe, of the Chelsea Yacht Club, the Redskin, the Teaser, and other well-known speed boats of the vicinity.

Racing from a standing start, the seaplane was outdistanced by the Nymph and Redskin at the opening of the unique contest, first official event of the kind in the history of yacht racing, because of the caution which Mr. Ovington had to exercise in keeping on the water. Disqualification was the penalty for flying.

When his marine competitors had gained a 50-yard lead the airman began to pick up and on the homestretch passed the Redskin. The seaplane worked up to even terms with the Nymph by the time the judges' buoy was only a half-mile away, and they came down in sight of the crowd nose and nose. Carefully guaging his distance Ovington opened up with a hundred yards still to go and won by nine seconds over the Nymph. So close had Ovington figured out how far the seaplane would travel at its finishing speed before leaving the water that he had not gone ten feet over the finish line before it took to the air. It was a fitting climax to the fine program that had been pleasing the crowds all the afternoon.

Cotton Plantations Inspected by Aeroplane

A plane has just been put into commission at the head offices of Goodyear Tire and Rubber Co.'s cotton plantations, at Phoenix Arizona, to enable the overseers to keep in closer touch with actual farming operations on the plantations.

In the aeroplane the manager of the two plantations, which are situated about 40 miles apart, each about 20 miles from the city, can reach either plantation in 15 minutes. Formerly it required nearly an hour to reach them, because of the adverse road conditions prevailing.

The plane is in charge of Lt. O. P. Johnson, a Goodyear employee who became an "ace" with our flying forces in France, his operations having been chiefly in and around Cambrai and Amiens.

This new method of permitting quick personal oversight of cotton-growing operations has many advantages over the former method of transportation by automobile. Recently a complete inspection of the 35,000 acres contained in both plantations was effected in less than one and one-half hours.

The Goodyear plantations are located in the Salt River Valley. The cotton grown in this valley is of a superior quality. During the war much of the cotton from this section was used in making wings for aeroplanes, although the greater portion of it found its way into automobile tires.

Passenger Service in Rhode Island

Newport, R. I.—A passenger-carrying service between Bristol and Newport has been inaugurated. The flying boat only takes a half hour for the trip. Several trips were made on the first day.

Exhibition Air Battle Thrills Boston Crowds

Nantasket Beach, Mass.—The thrilling battle in the clouds, which has been exhibiting here for some weeks, has attracted large crowds from Boston and nearby cities. The battle, involving all known stunts as practiced over the lines, is carried on daily by Lieut. Howard C. Brown and Lieut. Wesley L. Smith. A 3,000-foot parachute jump is made daily by Sergt. Murphy from a plane piloted by Lieut. Mark C. Hogue, director of the exhibition team. The night flight, involving the use of searchlights, colored fireworks and bombs, is particularly well received. The enemy plane, picked up by the searchlight, is downed in a flaming spiral dive, after the maneuvers of combat have been gone through.

Aeroplane Landing Field for Beaumont, Texas

Beaumont, Texas.—An aeronautical Club is being formed here for the purpose of establishing a landing field for aerial mail planes. The Retail Merchants' Association is assisting in the formation of the club, and the city has voted a tract of land to be utilized as a landing field.



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Group of officers and men who are accompanying the All-American Pathfinders, commanded by Lieut. K. C. Leggett, in the transcontinental recruiting flight

The AIRCRAFT TRADE REVIEW

Duesenberg Engines to Be Made in Rochester

New York.—Announcement was made here by the Duesenberg Motors Corp. that the Rochester Motors Co., Inc., Rochester, N. Y., had acquired all manufacturing and selling rights of the Duesenberg designed and Duesenberg type automobile motors. Production already has been started on a four-cylinder Model G-3 engine, known as the Rochester-Duesenberg, as a development of the Model G engine produced by the Duesenberg company early in 1918, having a rating of approximately 75 h.p.

Sidney Waldon and E. H. Sherbondy Designing Light Car

Detroit.—Sidney Waldon, formerly vice-president of the Packard Motor Car Co., and later colonel in the Aviation Section, and E. H. Sherbondy, former experimental engineer of the Air Service, have taken an office in Detroit, where they are designing a lightweight car embodying many advanced engineering ideas. It is not expected that the car will be on the market until next summer, as considerable experimental work will be done with the preliminary model.

Commercial Aviation in Central New York

Utica, N. Y.—Commercial aviation has come to Central New York to stay. With aeroplane corporations operating in Albany, Schenectady, Utica, Binghamton, Cooperstown, Syracuse and Rochester, the greatest of interest is being taken in matters of the air. Practically every principal fair in New York State this fall will have its aerial stunting program. The Mohawk Valley Aeroplane Corporation at Utica has bookings including the following fairs: Gouveneur, Lowville, Boonville, Watertown, Ogdensburg, Malone, Herkimer and Vernon, with others in abeyance. The Syracuse Aero Club, through arrangement with the Curtiss Aeroplane Corporation, is arranging exhibitions at the Syracuse State Fair, Hornell, Warsaw and Rochester.

There are now three base fields under operation by the Mohawk Valley Aeroplant Corporation, which began business this spring on a $30,000 incorporation basis. The concern has the Glenn D. Wicks Field at Utica with hangar, the Edmond Genet Memorial Field at Sylvan Beach where a hangar is to be built this fall, and the Virkler Field at Lowville. The corporation also has the use of the Smith Field at Herkimer and emergency landing fields at various points throughout the central portion of the state. These fields are to be marked and their location published in the near future for the benefit of transient aviators.

Lawson Has Co-operation of Spokane Chamber of Commerce

Spokane, Wash.—The Chamber of Commerce here announces that it is cooperating with the Lawson Aeroplane Company in its project of a transcontinental passenger aeroplane service.

Bills to Simplify Patent Procedure Framed

Washington, D. C.—The Patents Committee of the Engineering Council has collaborated with the similar committee of the National Research Council in developing a scheme for the improvement of the method of dealing with patents in this country. The staff of the Patent Office is itself actively engaged in this effort. Out of the report prepared by the National Research Council, and approved and adopted by the Engineering Council as the report also of its Patents Committee, remedial legislation has taken form. Three bills have been introduced, known as H.R. 5011, a bill to make the Patent Office independent of the Department of the Interior or any other department, and to simplify the procedure of the courts with reference to assessment of damages or profits for infringements of patents; H.R. 5012, bill to establish a single Court of Patent Appeals, and H.R. 7010, a bill to increase the force and salaries in the Patent Office.

Flight Instruction at Speedway Field, Philadelphia

Philadelphia, Pa.—At the Speedway Air Field, the official flying field of the Aero Club of Pennsylvania, located at Warminster, the Philadelphia Aero Service Corporation has its first class in flying receiving instructions. For convenience in instructing, small classes of three members each are formed, the course consisting of 450 minutes actual aerial work.

The class now at the field consists of Sergt. Roy K. Musselman, late of the U. S. Army, New Holland, Pa.; Lloyd M. Marshall, New York, and E. W. Park, a native of Korea. Sergt. Musselman has had many hours' air experience, as he was in charge of the ground force of several aviation training fields in this country during the war. He is taking his course at the Speedway Field to qualify for a pilot's license. Mr. Marshall is a prosperous merchant in his home town and is taking up aviation as a sporting diversion. Mr. Parks proposes qualifying as a pilot and returning to Korea with a plane for exhibition work. He believes he will be the first Korean air pilot.

The students are under the instruction of Lieutenant Paul F. Houser, lately an Army Air Service Instructor. Curtiss JN-4 training planes are used, having dual control. Under the instructor's directions the pupil is gradually allowed to assume control until he is competent to handle it alone. He is then permitted to make his test flights for his pilot's license before Official Observers appointed by the Aero Club of America. The following officials of the Aero Club of Pennsylvania will observe test flights and recommend the granting of licenses: Joseph A. Steinmetz, president of Aero Club of Pennsylvania, Paul B. Huyette and Lieut. Paul F. Houser.

"Ace" Plane in Flight from New York to Alabama

Montgomery, Ala.—The first of an order for ten "Ace" planes was delivered to G. Mason Perry at Montgomery, who is the distributing agent for these planes in Alabama, Georgia and Florida, after a successful cross-country flight from New York. The performance of the "Ace," which is one of the first commercial aeroplanes produced in this country, was most gratifying. Exhibitions were given en route at various aviation fields.

Experimenting with Fire Extinguishers for Aircraft

Realizing that fire extinguishers of the carbon tetrachloride type are ineffective for aircraft in flight, extensive experiments are being conducted to design an extinguisher which will operate under all conditions of flight. Fire extinguishers now used on aeroplanes depend upon the formation of a gas about the fire which cuts off the oxygen supply. Although this type of instrument is useful to fit on a plane for use when it is on the ground being tested, and in the hangar, it obviously cannot function properly when the plane is in flight.

The Fyr-Fyter Company of Dayton, Ohio, makers of high-grade extinguishers, are conducting extensive experiments with a view of producing an extinguisher which will be a protection when the plane is in flight.

White Sport Monoplane Uses Motorcycle Engine

Los Angeles, Calif.—The George D. White Co., of Los Angeles, is manufacturing a small sport monoplane powered by a motor cycle engine. The plane is of tractor monoplane type with a wing spread of 23 feet, length 14 feet, weight loaded 390 pounds. The maximum speed with 18 h.p. is 50 miles per hour and the flight range 150 miles without re-fueling.

The fuselage is not of the usual wire truss type, but is braced rigid with steel tubing so there is nothing to slacken and get out of line in bad landings or rough usage.

The elevators and rudder are connected with steel tube shafts and no wires or cables are used. The rudder is of the balanced type for easy control and the control of the elevator is equally simple with all non-essential parts eliminated.

The elevator is in one piece with the rudder above and not split and in two sections as when the rudder is inserted between. The machine is built very low with the wheels attached direct to the fuselage bottom. The spring wheels take all the landing shocks and have none of the disadvantages of V type landing gears with rubber cord which rots and deteriorates rapidly, generally collapsing at unexpected times.

The motor is an 18 h.p. air-cooled Harley-Davidson or Powerplus Indian which turns over from 2,100 to 3,000 revolutions per minute. The Simex propeller is connected with a countershaft and is a slow speed type with a high pitch, allowing maximum power from the motor at an efficient speed of the blade.

Although the monoplane is manufactured complete and equipped with 18 h.p. motors, motors of less power have been used successfully including Indian, De Luxe, Harley, Excelsior, Pope, Henderson and others.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Lewis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative



PILOTS

Dana C. DeHart
Edward V. Gardner
Eber H. Lee
John M. Miller
Leon D. Smith
Max Miller
Charles E. Bradley
Lester F. Bishop
Harold T. Lewis
Leslie E. Stancill
Charles Hugh Anglin
John H. Skoning
Earl F. White
Charles W. Lamborn
Frank H. Crozier
Walter H. Stevens

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

Praeger Addresses Dixie Highway Association

Demopolis, Ala.—Mr. Otto Praeger, Second Assistant Postmaster General, addressed the Dixie Overland Highway Association at its Sixth Annual Convention, held at Demopolis, Ala. Mr. Praeger stated that the aerial mail service has covered 272,628 miles and carried 11,845,980 letters since its inception fifteen months ago.

To-day eight Post Office Departments mail planes cleave the air daily, each carrying between 13,000 and 15,000 letters and traveling rain, blow or shine 1,900 miles each day.

The work of the Post Office aerial mail system, Mr. Praeger stated, demonstrates the possibilities of commercial aviation and the regularity with which schedules can be maintained.

"Let me cite a few instances," said Mr. Praeger, "in which the Post Office Department has contributed directly to the advancement of aviation. We have demonstrated the possibility of maintaining a dependable daily schedule by aeroplane the year round despite the assurances of so-called authorities to the contrary. We have encouraged men with promising devices when no other branch of the Government would lend them a helping hand.

"Through the encouragement given an inventor by the Post Office Department an improved compass is now in general use by aviators. This compass is a significant departure from the early aeroplane compass which was hopelessly useless at times because of the great tendency of the compass card to set up a spinning motion. The first of this better type of compass was built specially for air mail planes and was first used by the Post Office Department.

"We encouraged an inventor, who got no assistance elsewhere, in the development of a self-cleaning spark plug and one which would not crack or fuse in a high compression Liberty motor. That type of plug was developed on the air mail field at Washington and tried out and perfected on our air mail planes. There are several makes of such plugs now on the market.

"At the request of the Air Mail Service the Bureau of Standards started to work on a device to locate or spot accurately a landing field by sound at times of utter invisibility and that Bureau has invented and perfected a device that will enable an aviator blindfolded to locate unerringly the center of the field on which he is to land. This wonderful achievement of the Bureau of Standards has been accomplished on our air mail field and with the air mail planes.

All of the planes in the Air Mail Service are being made safe against fire by completely isolating the engine and gasoline compartments by asbestos fire walls, each compartment protected by pressure fire extinguisher system, and the mail itself is being safeguarded by non-inflammable canvas bags.

In concluding, Mr. Praeger urged opposition to any change in the administration of the air mail service which would subordinate it to a military organization.

UNITED STATES POST OFFICE

AIR MAIL SERVICE—EASTERN DIVISION

Monthly Report of Operation and Maintenance

JUNE, 1919

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helpers	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND UNIT COST: Gallons of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
														hr. min.				
4	$ .68	.....	$36.27	$33.19	$14.76	$49.57	$21.14	$27.39	.....	$67.50	$28.89	$273.39	2	3 00	*218	109.00	$91.08	$1.25
7	8.16	$1.50	36.27	33.19	14.76	49.57	17.05	50.44	$10.08	67.50	28.89	317.41	24	2 25	175	7.29	131.34	1.81
10	33.81	20.06	72.89	33.20	14.76	81.96	48.03	66.20	366.40	46.24	28.89	812.44	109	6 50	418	3.83	118.86	1.94
11	30.70	22.72	72.89	33.20	14.76	81.88	45.46	217.72	10.70	46.24	28.89	605.16	102	6 28	488	4.78	93.54	1.24
12	112.83	80.63	72.89	33.20	14.76	110.50	193.92	187.33	128.16	46.24	28.89	1,009.35	360	27 38	2022	5.61	36.48	.50
14	98.83	114.28	72.89	33.20	14.76	108.88	313.08	283.97	63.54	46.24	28.89	1,178.56	655	44 45	3014	4.60	26.28	.39
15	139.54	69.86	72.89	33.20	14.76	98.62	285.45	262.79	45.93	46.24	28.89	1,098.17	447	40 41	2633	5.89	26.94	.42
16	.....	.....	12.17	33.20	14.75	3.00	.....	16.42	764.35	46.24	28.89	919.02	.....	.....	.....	.....	.....	.....
17	124.77	64.09	72.89	33.20	14.75	99.40	270.83	210.70	61.05	46.24	28.89	1,026.81	406	38 36	2694	6.64	26.58	.38
31	10.68	.....	12.17	33.20	14.75	3.15	.....	62.29	94.50	72.50	28.89	332.13	35	.....	.....	.....	.....	.....
33	.....	.....	12.17	33.20	14.75	3.00	.....	19.75	109.00	72.50	28.89	293.89	.....	.....	.....	.....	.....	.....
38	7.50	4.80	30.68	33.20	14.75	20.77	.....	67.25	35.00	72.50	28.89	315.34	25	.....	.....	.....	.....	.....
38a	28.98	3.50	12.17	33.20	14.75	3.00	8.27	.72	8.00	72.50	28.90	213.99	95	1 10	150	1.58	183.42	1.43
39	43.78	16.30	72.89	33.20	14.75	77.02	33.06	80.84	6.90	72.50	28.90	480.14	141	4 42	436	3.09	102.12	1.10
42	61.00	7.25	30.27	33.20	14.75	9.67	29.90	38.05	49.70	72.50	28.90	375.19	200	4 15	330	1.65	88.26	1.14
43	72.38	7.00	48.75	33.20	14.75	23.17	50.36	46.21	11.90	72.50	28.90	409.12	235	7 10	648	2.76	57.06	.63
71	91.25	12.50	72.85	33.20	14.75	72.74	82.86	103.67	34.14	50.00	28.90	596.86	282	11 48	993	3.52	50.58	.60
78	37.21	4.63	30.27	33.20	14.75	9.67	43.11	22.18	36.19	50.00	28.90	310.11	122	6 08	470	3.85	50.52	.66
79	62.69	9.08	68.85	33.20	14.75	162.98	61.46	121.54	38.69	50.00	28.90	652.14	199	8 45	756	3.80	74.52	.86
80	278.23	22.75	48.76	33.20	14.75	23.17	174.79	160.14	191.29	50.00	28.90	1,025.98	907	25 03	2115	2.33	40.92	.49
81	103.42	13.20	68.84	33.20	14.75	37.03	118.16	165.32	222.15	50.00	28.90	854.97	330	16 50	1291	3.91	50.76	.66
82	156.43	14.47	68.84	33.20	14.75	37.03	150.19	134.18	1,119.64	50.00	28.90	1,807.63	495	21 24	1736	3.51	84.42	1.04
83	125.67	18.25	48.74	33.20	14.75	23.17	103.31	130.15	32.59	50.00	28.90	608.73	409	14 43	853	2.09	41.34	.71
84	50.33	7.50	30.26	33.20	14.75	9.67	10.03	100.79	205.08	50.00	28.90	540.51	165	1 25	120	.73	381.48	4.50
85	38.43	7.00	30.26	33.20	14.75	9.67	.....	23.41	15.69	50.00	28.90	251.31	126	.....	.....	.....	.....	.....
24239	51.24	4.87	48.74	33.20	14.75	23.17	76.08	77.40	137.19	50.00	28.90	545.54	168	10 50	910	5.42	50.34	.60
39364	47.43	13.10	72.96	33.20	14.75	77.01	39.02	86.09	10.40	72.50	28.90	495.36	152	5 33	386	2.54	89.22	1.28
39365	11.90	.49	36.26	33.20	14.75	49.57	.....	85.25	.73	72.50	28.90	333.55	35	.....	.....	.....	.....	.....
44300	10.17	2.63	30.26	33.20	14.75	9.67	62.05	32.65	96.13	46.24	28.90	366.85	33	8 50	535	16.21	41.52	.69
44301	59.99	8.65	54.36	33.20	14.75	81.38	114.07	88.86	7.53	46.24	28.90	537.73	197	16 15	898	4.56	33.06	.60
Total..	$1,898.03	$ 551.11	$1,451.40	$995.98	$442.57	$1,449.09	$2,351.68	$2,963.70	$3,912.65	$1,703.66	$866.88	$18,586.75	6456	335 14	24289	3.76	$55.44	$ .77

Cost per mile, overhead, $.23; cost per mile, flying, $.20; cost per mile, maintenance, $.34.
*(Note)—Plane No. 4 one trip on gas furnished and charged previous month.

OTTO PRAEGER, Second Assistant Postmaster General.

THE LIBERTY CAPRONI BIPLANE

THE Liberty Caproni Biplane is derived from the Type Ca-5 built by the Italian Caproni Company, which, together with the well-known Ca-3 and Ca-4 types have been in use on the Italian and French fronts during the latter months of the war.

The Liberty Caproni was developed entirely in America at the shops of the Standard Aircraft Corporation, Elizabeth, N. J., and later at the plants of the Fisher Body Corporation, Detroit, Michigan. The engineering was superintended by Captain U. V. De Annunzio, formerly chief engineer at the Caproni Works in Milan.

When the armistice was signed the Fisher Body Corporation had most of the dies and jigs ready for rapid production of these Caproni Machines which were scheduled to appear at the French front in January.

Like all the bombing planes of the Italian design, the Liberty Caproni has twin fuselages. Each fuselage carries a Liberty "12" engine with a tractor propeller and the center nacelle carrying a pusher. It is equipped with apparatus for day and night bombing work. Machine guns are carried at the front and rear of the nacelle. The front gunner's cockpit is arranged to permit of the installation of a 37 mm. gun. Arrangement is made for carrying the entire load of Mark I and Mark IV Bombs entirely enclosed.

The two fuselages, the elevator, and the stabilizer are built up in two sections to facilitate packing, transportation and assembling.

To make quantity production possible, special materials and parts have been systematically eliminated and replaced with parts and materials of American standard types and qualities.

The general specifications of the Liberty Caproni are as follows:—

Dimensions

Span upper plane (measure taken on trailing edge)	76'-9-11/32"
Overall height (at aileron levers)	14'-9- 5/16"
Overall length	40'-9- 5/8"
Chord	9'-1- 3/4"
Gap between planes	8'-9- 7/32"
Gap to chord ratio	0.94'

Areas

	(*Sq. ft.*)
Main planes	1378
Stabilizer	78.892
Elevator	50.141
Rudders (each rudder 26,943 sq. ft.)	80.829

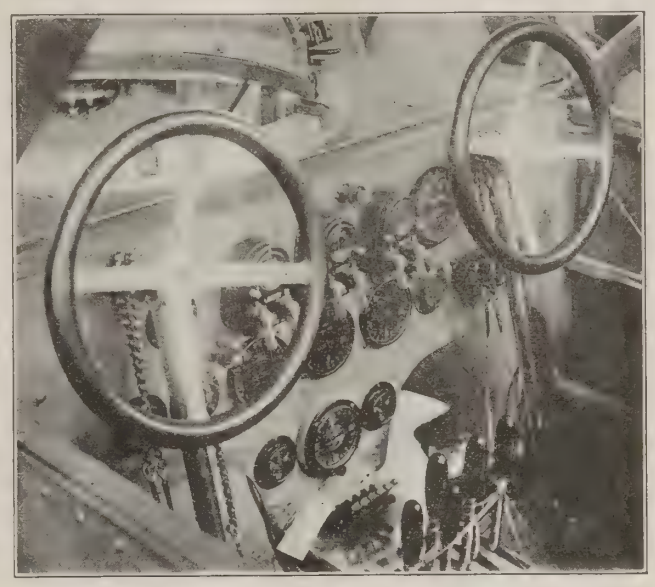
Weights

	(*Pounds*)
With full load for day bombing (A)	12818
With full load for night bombing (B)	13137
Weight per sq. ft. of wing area (A)	9.14
Weight per sq. ft. of wing area (B)	9.37
Weight per HP. (A)	12.20
Weight per HP. (B)	12.50
Weight distribution in % of totals (night bombing B):	
	(%)
Structural Weight	24.90
Power Plant	32.90
Fuel and Oil	21.30
Military or useful load	20.90

(B)

Performances

Climb to	*Time (minutes)*
6500 ft.	11
10000 ft.	22
13000 ft.	39
15000 ft.	56
Ceiling	70
Altitude	*Speed (M.H.P.)*
400 ft.	105
10000 ft.	96

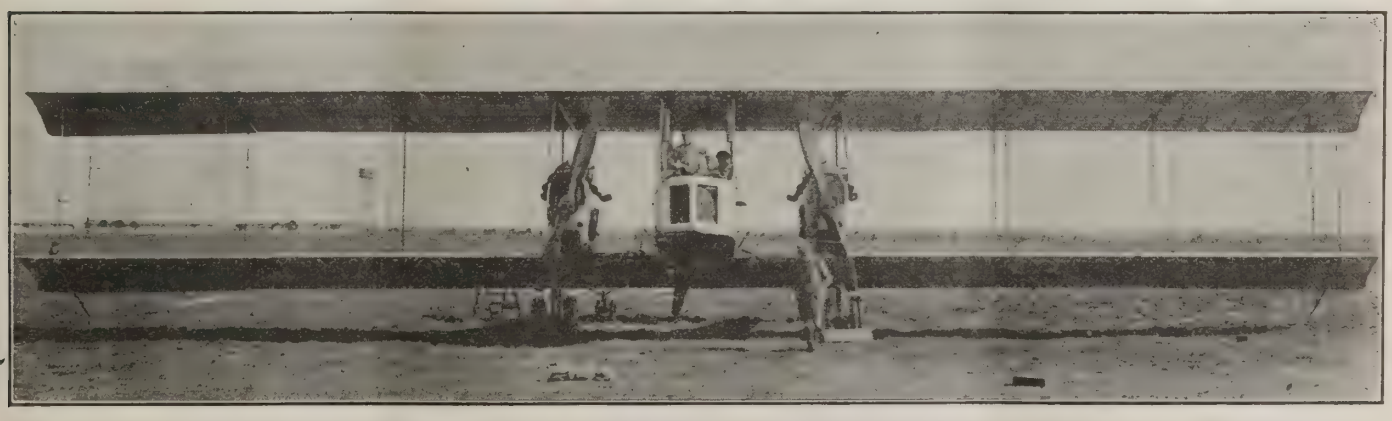


Dual control and instrument board on the Liberty Caproni biplane

Main Planes

Main planes are built up in five sections, the corresponding sections in upper and lower plane being equal in length. The main section is the center lower section: nacelle, fuselages, power-plant and chassis are concentrated on that section, which arrangement reduces to a minimum the space required for assembly, and makes it easy to transport the central part of the plane on ordinary roads, the tail fastened to a truck and the machine rolling on its own chassis.

Intermediate and outer sections are fitted to the center section and to each other by means of male and female box-fittings and pins. The outer sections in the upper and lower plane carry the ailerons. The wing spars are in ash for the center section upper and lower plane and for the intermediate sections upper plane; in all the other wing sections they are in spruce; all of them are of box beam section and wrapped between rib and rib with strong linen. Like in all Caproni constructions ribs, double ribs and boxribs are of white wood and ash; the capstrip is screwed, not nailed. The internal bracing of the wings is as usual with cables



The American built Caproni biplane with three Liberty "12" 400 h.p. engines

and tie-rods. The covering is in grade A linen and nailed on the rib cap-strips and on the edges. Maple batten strips are screwed above the linen in correspondence to the ribs.

The interplane struts are seamless steel tubing with steam-lined wooden reinforcement, except for the four nacelle struts and the two rear fuselage struts which are ash. Transversally the interplane struts are braced according to the peculiar Caproni method. They are connected to the spar fittings by means of pins.

All lift cables are double except in the outer station. The landing cables are single. All of them are spliced and not soldered.

Steel sheet and oxy-welding are largely used for the fittings.

Angle of lower wing chord, 5°-30'.

Nacelle

The nacelle is a combination of the usual construction with longerons, struts and tie-rods and of the veneer structure. It is connected to the center wing sections by means of four ash struts. The general arrangement is similar to the one adopted in the precedent types of Caproni Bombers. In the front of the nacelle there is a cockpit with revolving machine-gun mount for the front gunner and observer. The two pilots are seated side by side back of the front gunner, from whom they are separated by a large dashboard on which all the instruments for the control of the power plant are disposed. Spark, gas and altitude adjustage are controlled for the three engines from a board situated between the two pilots. Back of that board and well accessible to both pilots is the gasoline distributor controlling the entire gasoline system.

The plane can be controlled by either pilot at will. As usual, a double foot bar and a double combination of wheel and stick control rudders, ailerons and elevation is provided.

The bomb-sighting device, the bomb-releasing mechanism, the shutters on the radiators, the camera, the lighting and heating system are all controlled from the pilots' seats.

Back of the pilots are two large gasoline tanks, followed by a big compartment limited by the front and rear wing spar of the center section lower plane and the lower longerons of the nacelle. This compartment contains the bomb-rack and a small seat for the rear gunner. The bottom of the compartment is fitted with three trap-doors, which are opened by the first bomb while dropping and closed at will by the pilots by means of a Bowden wire control.

At the rear end of the nacelle is the center engine with pusher propeller. The engine bed is supported by three braces of bass-wood, ash and ply-wood. Oil tank and oil radiator for the center engine are located so as to avoid long tubings.

Above the rear engine is a plate-form with a turret for the rear gunner, dominating the rear sector of the machine.

The radiators for the center engine are in the nose of the nacelle, while above the cylinder heads and close to the engine an expansion tank is provided. The nose radiators are surrounded by an aluminum cowl and fitted with shutters.

Fuselages

Both fuselages are identical. Each one of them carries on the nose one of the tractor engines. They are flat-sided and of the usual construction with four ash longerons, compression struts and tie-rods. The fittings are of sheet steel, designed so as to avoid bolts going through the longerons. The four longerons converge at the rear end of the fuselage in a steel tube terminal, which carries an elastic Pensuti tail skid. The terminal supports also one of the rudders.

Besides its engine and nose radiators, each fuselage contains two gasoline tanks, one oil tank and, along one side, an oil radiator. The fuselage is attached to the front and rear spar of the lower center section, while pins connect the engine beds to the V struts.

Chassis

The chassis is of the usual Caproni type; the two U struts are of laminated ash and spruce wrapped with strong canvas fabric reinforced with a steel tube bracing. The wheel axles, one on each U strut, are kept in place by rubber chord acting as shock absorber and by two oscillating rods, ending at the front end in a universal joint which has its seat on the same fitting on which the main bracing cables of the chassis end. Each axle carries two double wheels over which mudguards are provided.

Control Surfaces

All control surfaces (stabilizer, elevator, rudders and ailerons) are of steel tube; the ribs of the stabilizer are stamped steel sheet. Rudders are balanced, braced with steel tubes and interconnected with steel cables. The stabilizer is braced to the fuselage terminals with steel tubes.

All levers are of stamped steel sheet and can be easily removed from the surfaces so that much space is spared in packing the surfaces themselves.

The control cables are carried on bronze pulleys fitted with ball-bearings. The cables controlling the tail surfaces are all double.

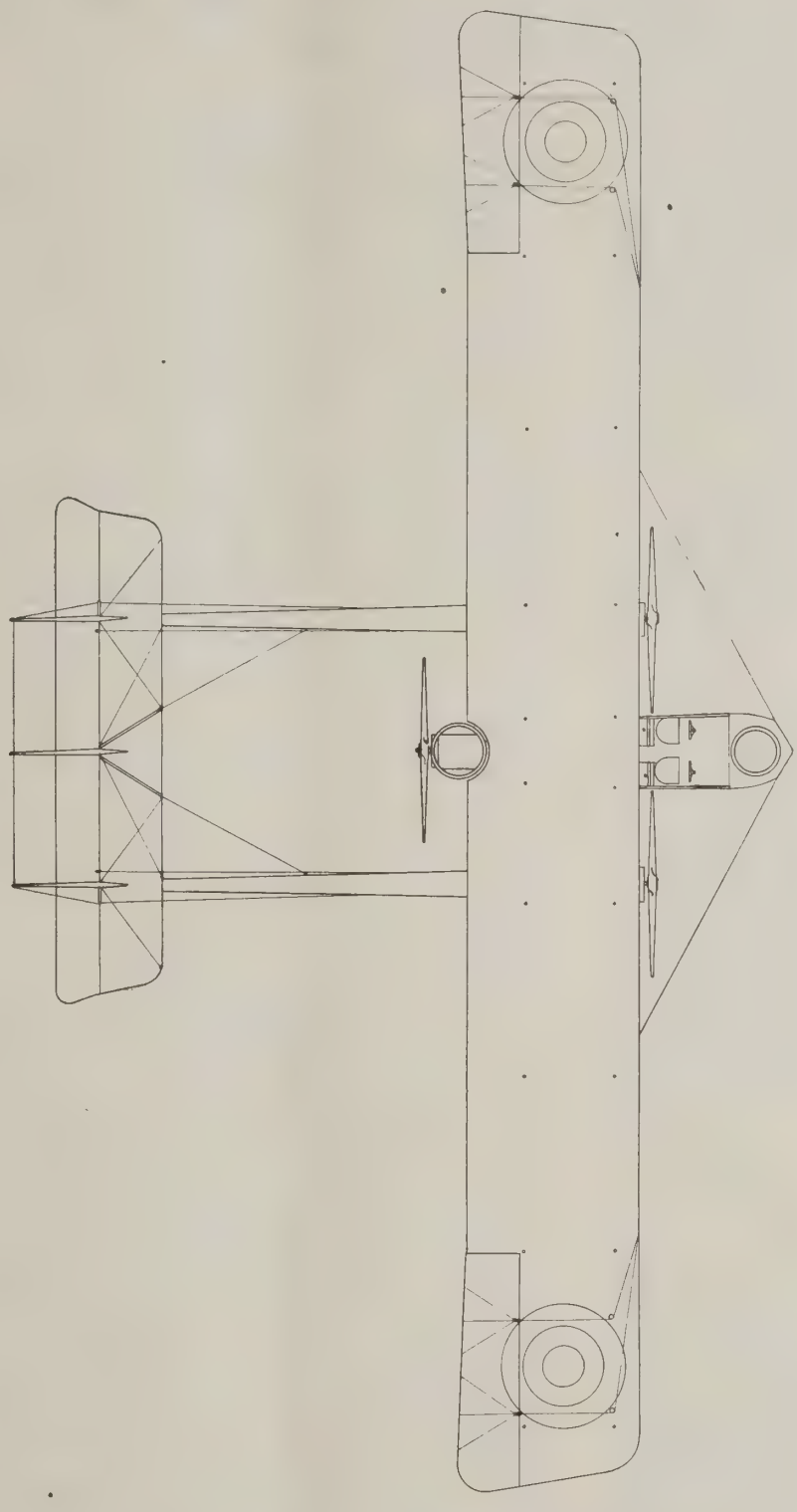
Power Plant

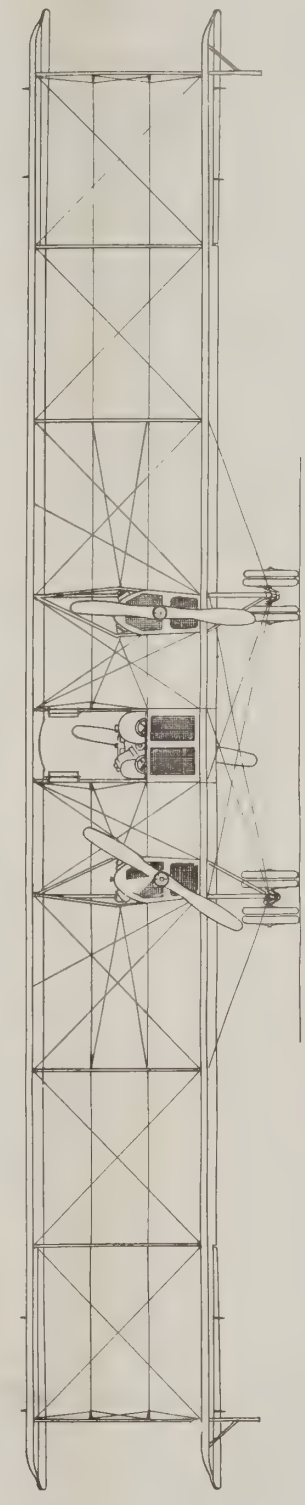
The machine is equipped with three Liberty-12 engines, Army type (high compression). Carburetors, ignition and

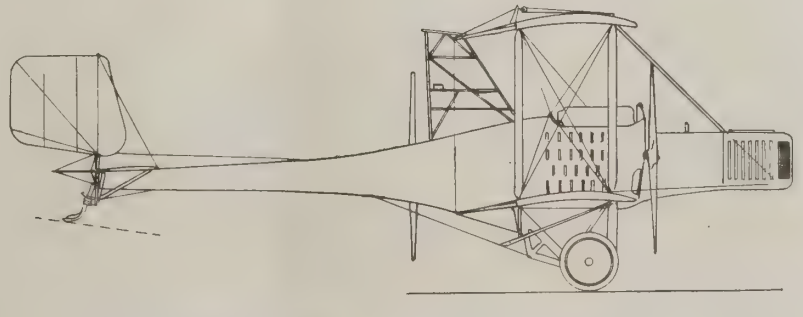
(*Continued on page* 1108)



Side view of the 1200 h.p. American Caproni bombing biplane







CAPRONI
3-LIBERTY ENGINED
BIPLANE

Meters
1 2 3 4

McLaughlin

REPORT OF THE AMERICAN AVIATION MISSION ON EUROPEAN TOUR

(Concluded from last week)

IN the foregoing brief presentation of its conclusions, your Mission has touched upon the aeronautical policies already in effect or under present discussion in England, France and Italy. Great Britain's plan of orrganization certainly warrants our most careful consideration. Its salient points are clearly set forth in the chart herewith attached. It is not argued that the British method is perfect, but it can be stated without fear of contradiction in any quarter, that it stands today the most comprehensive governmental mechanism yet set up by any nation in the world for the encouragement, upbuilding, direction and control of its air resources. This organization has been born of five bitter years of trial, mistake, experience and progress. It is the product of the best brains in the British Empire focused under the spur of national need and the demand of the British people. We in America may well study it carefully.

Your Mission, in presenting its recommendations, desires to emphasize the view everywhere encountered that the future of aerial navigation and of aerial development generally, is in only a limited sense a function of military and naval establishments. The air is a medium for commerce and communication and its direction to the peaceful uses of civilization must be unhampered by the necessarily restrictive views of these specialized departments.

Recommendations

A. The concentration of the Air Activities of the United States, Civilian, Naval and Military, within the direction of a single governmental agency, created for the purpose co-equal in importance and in representation with the Departments of War, Navy and Commerce.

B. That the agency thus created be charged with full responsibility for placing and maintaining our country in the front rank among nations, in the development and utilization of aircraft for the national security, and in the advancement of the civil aerial transportation and communication arts.

C. That this governmental organization be formed in general as follows:

1st. A civilian secretary for air.

2nd. An assistant secretary, a civilian, responsible directly to the Secretary for Air, for the management and operation of the Department

3rd. Five or more Divisional heads acting as chief of the sub-departments of (a) Civil Aeronautics, (b) Military Aeronautics, (c) Naval Aeronautics, (d) Supply and Research, (e) Finance, etc.

4th. An Air Council, advisory in character, which shall be constituted by the Secretary of Air, including the Assistant Secretary of Air, the chiefs of the several sub-departments, and such other personnel as may be deemed advisable.

We desire especially to invite attention to the complexity and newness of the whole development of the Aviation Art, and to urge the broadest possible treatment of the subject during this formative period. We suggest that the lesser details of organization may well be left to the judgment and initiative of those called to assume the responsibility of directing this work. We desire also, in this connection, to call attention to the aircraft interests of the Allied Governments, and to emphasize the necessity for careful discrimination in the selection of men of industrial experience and broad vision.

D. The establishment of governmental institutions of education and training, including an air college, all open alike under proper restriction, to military, civilian and naval personnel.

E. Such curricular and such arrangement of promotion in the National Air Service, and such assignment and pay as to insure to the young man an attractive career, whether he elect to remain permanently in the "National Air Service" or return to Army or Navy, or to civil life.

F. The adoption of a system whereby Army, Navy and civil personnel can be circulated in proper proportion through the National Air Service. This personnel would, unless permanently assigned to Air work, be automatically returned to the Military and Naval sources, or to civil life as an Air Service reserve after the educational and service periods in the National Air Serice have expired.

It is felt that such a circulating system is vital to the coordination and ultimate efficiency of the three services, and to the desired dissemination of a knowledge of and interest in the Air among our people. The young officers of today will command the military and naval forces of tomorrow, and will carry with them into the highest ranks and intimate knowledge of aircraft, and of the strategy of its varied uses, in connection with operations on land or sea. The direction of civilian and commercial activities of all kinds will be made possible, and the closest contact and cooperation between the Government and the aeronautical industries assured.

All international relations touching aerial matters fall naturally within the jurisdiction of the Secretary for Air.

All responsibility for the Supply of Aircraft material and equipment of all kinds, and for the training of personnel for all branches of the service, is, in accordance with these recommendations of your Mission, placed with the Secretary for Air. As some twenty-seven thousand items are involved in the equipment and maintenance of each Air Squadron an active duty, the need for a single responsible direction seems undebatable.

Under this plan of organization here recommended, all squadrons and all equipment assigned by the National Air Service to meet the stated requirement of the Military and Naval establishments, pass automatically under Army and Navy command. Under National Air Service operational direction, remain only those independent projects unrelated to the activities of the Military and Naval fighting fronts and such personnel and equipment as forms a surplus to the needs of the sea and land fighting arms.

The question of governmental organization for the development and utilization of our country's air resources has been given consideration by your Mission, seemingly from every angle. The recommendations made are general. No report could be made effective, if burdened with the mass of details involved in the setting up of any governmental mechanism such as proposed.

There have been, and will continue to be advanced many objections to the establishment of a Department of the Air. We believe none of them will prove insurmountable. We believe the advantage gained to be such as to entirely overshadow any temporary difficulties.

Always in the past, in war by land or by sea, and in the transportation activities of peace, we have thought in two dimensions only. We must now readjust our minds to think for all future time in three.

When this Mission left the United States in May its members were hoping the Atlantic Ocean might be crossed before January 1, 1920. Within the two months of our absence, four successful crossings have been made and without the loss of a single life.

There must be no over-optimism. There are years of development and experimentation ahead. As in the case of all the other great agencies of civilization, the commercial and financially profitable use will come slowly. But here the immediate welfare and safety of our nation is involved and an intelligent and efficient direction of our aeronautical affairs will be demanded by the American people. American genius has given to the world the Airplane, a new instrument of commerce and of war. But America has left its development to other nations, and too late, realized the mistake of this neglect. She has paid the price! America now again has the opportunity, if not to lead, at least to take her place in the front rank and to gain to herself the full benefit which will surely accrue from an active and sincere cooperation in the engineering activities, and in the scientific and commercial aircraft developments of those nations associated with us in the war.

But this will be impossible, in the future as in the past, if our aircraft activities remain dispersed among the several governmental departments and impossible of coordination for decisive action.

Upon the breadth of view and the vision of those in control of America's policies, depends our future as an Air Power.

Commercial Development

With reference to the commercial development of aviation your Mission makes its recommendation based upon the following conclusions which have been formed, first, through knowledge of conditions existing at present in America, and second, the knowledge gained by its investigations abroad.

The investigations in England included visits to a number of factories, aerodromes and other points of particular interest, and interviews with the following gentlemen:

England:

Major General Hugh M. Trenchard, K.C.B., D.S.C., Chief of Staff, Air Ministry

Major General Sir Frederick H. Sykes, K.C.B., C.M.G., Controller General, Civil Aviation.
Major General E. L. Ellington, C.B., C.M.G., C.B.E., Director General Supply and Research.
General Huggins.
Mr. Douglas Vickers, Vickers Co., Ltd.
Captain P. D. Ackland, Vickers Co., Ltd.
Sir Percy Gerouard, Armstrong, Whitworth & Co.
Sir Samuel Waring, of Waring & Gillow, who is also interested in five other aeronautical companies in England.
Mr. Holt Thomas, Aircraft Manufacturing Company.
General Sir W. S. Brancker, K.C.B., D.F.C., Aircraft Manufacturing Co.
Mr. White Smith, British and Colonial Airplane Co.
Mr. J. A. Taylor, Cosmos Engineering Co.
Mr. Fadden, Cosmos Engineering Co.
Mr. Handley Page, Handley Page Co., Ltd.
Mr. Graham White, Graham White Co.
Mr. C. V. Allen, Secretary of the Society of British Aircraft Constructors.
Mr. Leslie P. Langton, Black and Manson Insurance Underwriters, who have specialized in aircraft insurance.

Factories of the following companies, engaged in the manufacture of aeroplanes and motors, were visited:

Members of the Mission also visited the airship factory of Armstrong, Whitworth & Co., located at Selby, and the dirigible aerodrome of the British Navy located at Pulham, where they examined the R-33, which is a replica of the R-34, and several smaller airships.

The Mission's investigation in France included visits to a number of French factories and flying fields, and interviews with the following gentlemen:

France:

General M. Duval, Directeur du Service Aeronautique.
Senateur Gaston Menier, Chairman of the Comite Aeronautique au Senat.
Mr. Pierre Etienne Flandin, Deputy, and former Chief of the Organe Interallie a L'Aeronautique.
Commandant D'Aiguillon, of the Commission Interministerielle de l'Aviation Civile.
Commandant de St. Quentin, Chief of the Service de Fabrication de L'Aviation.
Mr. Louis Breguet, of the Breguet Co., and Compagnie des Messageries Aeriennes.
Mr. Bleriot, of the Bleriot Co.
Mr. Maurice Leblanc, Bleriot Spad Co.
Mr. Kapherer, of the Societe Astru.
Mr. Bazaine, of the Societe Nieuport.
Mr. Maurice Farman, of the M. & H. Farman Co.
Mr. Granet, Secretary of the Chambre Syndicale de l'Industrie Aeronautique.
Mr. Esnault-Pelleterie, President of the Chambre Syndicale de l'Industrie Aeronautique.
Lieutenant Rene Fonck, Premier French Ace.
Mr. Maurice de St. Blanchard, Secretary of the Aero Club de France.
Comte de Libersee, former pilot and at present much interested in the development of civil aeronautics in France.

Among the factories visited were:

Morane-Saulnier factory.
Breguet factory.
Bleriot factory.
Farman factory.
Hispano-Suiza factory.
Renault factory.

All of which are engaged in the manufacture of aeroplanes and motors.

The investigation in Italy included interviews by representatives of the Mission with the following gentlemen:

Italy:

Signor G. Grassi, Deputy, Ex-Chief of the Italian Aeronautical Mission in France.
Colonel Guidoni, Italian Foreign Aeronautical Mission.
Admiral Orsini, Commander of Italian Aviation.
Captain Bursaglia, Chief of Staff to the Minister of Marine.
Signor Peroni, Director of the Ansaldo Co.
Signor Casatti, of the Caproni Co.
Signor Buzio, of the Macchi Co.

Representatives of the Mission also visited the following factories in Italy, all of which are engaged in the manufacture of aeroplanes, balloons and motors:

Pomilio Co.
Ansaldo Co., at Torino.
Caproni Co., at Milan.
Issotto-Franchini, which was shut down due to a strike.

1. One of the most important problems to be considered in the rehabilitation of the world's commerce, following the close of the war, is the development of aerial transportation for commercial purposes. Its one invaluable service, and that in which it surpasses all other means of transportation, is speed, that time-saving element which the world has always striven for, and for which America, with its great distances, has such serious need. Reliability, safety, economy, and those other qualities of transportation service which are of value, will steadly improve as the use of aircraft increases and experience accumulates.

2. It is as impossible to forecast the future of this new medium of transportation as it would have been to describe the speed, comfort and safety of the modern steamship at the time the first steamship crossed the Atlantic. It is safe to say, however, that in time it will become one of the great transportation mediums of the world and will continue to offer the fastest and most direct means of transportation for persons, mail, and light freight, known to civilization. Its development is limited only by the perfection of the mechanical devices used, with which we are constantly becoming more familiar, and by the extent of our knowledge of the atmosphere which is becoming more thoroughly understood each year.

3. It is equally difficult to determine the speed with which this development will take place. In fact, this will be determined largely by the opportunities afforded to employ the brains of the engineer and the scientist on the problems involved, which in turn will be controlled by the financial resources available for such work. It is thought by some well-informed authorities that the next five or ten years will see this new industry through its initial stages, and established on a self-supporting basis, providing it is encouraged at this time. Adequate support cannot be expected from private enterprise alone, and if no outside aid is given, ten years will probably see this industry in America still struggling for a foothold, and far behind its European competitors who will receive substantial aid of many kinds.

4. History has shown repeatedly that no nation can afford to neglect the highest possible development of its transportation mediums, regardless of the opportunities existing for immediate profit to the private enterprise concerned. This is particularly true of aerial transportation, which is not local in its nature, but which is essentially of a national and international character, due to the great distances covered, and to the speed with which it links together far distant points. This principle has been so clearly understood that an international agreement has been established between the Allies and their associates, by which international flight of aircraft has been provided for in a far-sighted manner, thus making immediately possible the flight of private craft from one country to another on a basis as clearly defined by law as that governing the movement of steamships, except, of course, that the practice of ages of ship travel is missing in the case of aircraft.

5. The development of aviation is progressing so rapidly at this time that it is difficult even for those in close touch with it to keep up with its progress. During the past two months the Atlantic has been crossed four times by aircraft; first, by a seaplane of the American Navy; second, by a an aeroplane of Great Britain, and, finally, by an airship of Great Britain which has twice demonstrated its ability to fly between England and America. All of this has been accomplished without the loss of a single life. Airships are now building in England which will be able to carry from five to ten tons of mail, in addition to the necessary fuel and crew, and cross the Atlantic from London to New York, in one-half the time made by the fastest steamships. Who can say such transportation facilities will not greatly serve civilization, and be of immeasurable value to our own country if properly developed and used?

6. Already lines of aerial transportation are being used in England and France in a small way for commercial purposes, but the distances in these countries are so short that relatively little advantage can be gained, so such ventures will develop slowly. A daily service from London to Paris has been in operation for some time, and promises to be quite serviceable as soon as it can be relieved of its war time military supervision. Other lines now in operation are from Paris to Lille and Brussels and from Paris to various points in Alsace-Lorraine and German occupied territory. Among other plans English private interests are projecting aeroplane lines from Cairo to the Cape and Cairo to Bombay, and French interests are planning to run a line to Algeria and Morocco. These lines will carry mail, passengers, and express, and it is expected that they will materially shorten the time between European centers and their far distant terminals. The United States Post Office Department has carried mail by aeroplane from New York to Washington for over a year with a record of nearly one hundred per cent delivery at each end every day. It is now inaugurating a line from New York to Chi-

cago which will shorten the mail time between these two points to about one-half. It is also projecting a two-day service from New York to San Francisco. England is already desirous of organizing with the United States a transatlantic airship line for mail service which would give a five-day mail service from London to San Francisco. Such a service is entirely possible at this time, and its inauguration depends only upon adequate encouragement and financial support.

7. The risks involved in these ventures, due to unknown conditions of the atmosphere, imperfections of equipment, etc., are still so great as to make them impracticable from the point of view of private enterprise, undertaken for a profit. If left entirely to such private enterprise, aerial transportation will develop slowly and with many losses and backward steps, as did the steamship, the railroad, and the automobile, each of which, however, has ultimately become a vital factor in our civilization.

8. One of the striking features of our investigation in Europe was the unanimous belief that the use of aircraft in warfare and for national defense would continue to increase and that in the next war, whenever it might come, aircraft would be a far more vital factor even than it has been in this war. One of the geatest military authorities in Europe stated that in his opinion the first battle of the next great war would be in the air, and would very nearly decide which side would win, in that the side winning in the air would immediately have acess to all of its enemy's sources of supply and production, and would quickly cripple them by air raids upon an enormous scale. The opinion was everywhere expressed that the development of aircraft for purposes of national defense must continue and that sufficient flying and production facilities and personnel must be maintained at all times to insure an adequate supply in case of need. Due to the complicated and delicate nature of such equipment, to its rapid depreciation in use, and to its constant obsolescence, the expense involved in such a program would be very great, in fact almost prohibitive in peace times.

9. The existence of an aerial transportation industry with a great commercial air fleet and of a strong production industry would greatly decrease the need for strictly military equipment and resources, in that practically all of the aircraft and landing field facilities and personnel, and the manufacturing and maintenance facilities and personnel employed by such commercial activities, would be available as a reserve in time of war. It is evident, therefore, that the most economical way to develop a strong air service for national defense is to encourage by every means possible the use of aircraft for commercial purposes, and thereby build up a commercial fleet at relatively small expense to the government, which would effectively supplement its strictly military equipment, in time of need. America's experience during the war has proven conclusively that aircraft facilities and technical personnel, and particularly production facilities and technical personnel, cannot be obtained upon short notice, but only by long and continued experience and at great expense.

10. America's production industry reached large proportions during the war, but since the signing of the armistice it has shrunken to a very small volume. Unless immediate attention is given to its conservation, it will practically disappear, and a considerable portion of the great sums expended in its development will have been spent fruitlessly. This industry does not require a large volume of business to keep it alive and healthy, but it does require a steady and dependable demand, otherwise private capital and enterprise will not long remain interested.

Recommendations

Upon the basis of these conclusions, we offer the following plan for stimulating the development of commercial aviation as an aid to national defense, and as a response to the demand that is already developing for improved commercial transportation though the use of aircraft.

A. The Civil Aviation Division of the National Air Service should establish with the advice of the Army and Navy, and the Divisions of Military and Naval Aeronautics, a series of flying routes throughout the United States and its possessions and to contiguous foreign countries, which will be of military and commercial value. It should also prepare and publish maps and descriptions of each of these routes, suitable for the use of fliers.

B. There should be provided at national expense certain flying fields in strategic locations, and suitable for military purposes, and encouragement should be given to the various States and Municipalities to provide flying fields upon all flying routes, at points found desirable, thus eliminating the necessity for private ownership of flying fields except for strictly private use. Hangars should be provided at each flying field by the governmental authority owning the field (that is, Federal, State or Municipal), or where such fields are used constantly by private interests, they should be permitted to provide their own hangars immediate adjacent to and opening upon such flying fields.

The operation and use of such flying fields should be controlled by Federal law, so as to obtain uniformity throughout the nation and conformity with international regulations.

C. All flying routes and flying fields should be equipped at national expense with signalling and communication systems, including wireless telegraphy, wireless telephony, and searchlights, to thoroughly safeguard and guide aircraft in flight. The Government's attitude in this matter should be the same as that maintained toward shipping in its lighthouse and coast patrol service. The operation of signalling and communication equipment should be controlled by Federal law for the reasons indicated under item "B."

D. A meteorological service should be developed to provide fliers and other aviation interests with accurate weather reports and other atmospheric data necessary to govern their activities intelligently. The value of this service to commercial aviation cannot be overestimated, as it will go far toward establishing reliability and safety of service, just as weather reports are of immeasurable value to ocean and lake transportation.

E. Training facilities should be provided at various localities throughout the country, either at Government expense or by private enterprise under Government regulation, with guarantees from the Government of a sufficient number of students to cover expenses. Such guarantees could be given by the Government without undue expense if it used such schools for the preliminary training of its military personnel. Such a plan would encourage private enterprise to provide facilities for the training of the personnel needed for commercial requirements, which personnel in turn should become a permanent reserve for military requirements in time of need. There should be established at least one school for the teaching of aerodynamics and other branches of the science of aeronautics as recommended under the heading "Organization." Encouragement should be offered to universities throughout the country to establish departments of aeronautical science.

F. The Government should encourage the development of new design and aeronautical technique for commercial purposes along the lines recommended under the heading of "Technical Development."

G. The Department of Aeronautics should maintain the closest possible relations with all civilized nations in determining and applying the rules and regulations which will givern the international use of aircraft, and there should be developed as rapidly as is consistent with proper consideration a body of Federal law governing the use and air worthiness of aircraft for commercial purposes, which will safeguard life and property, and promote the commercial usage of aerial transportation.

In order that commercial aviation may be helped and not hindered by such legal restrictions, it is of vital importance that aerial transportation be recognized at once as an element of interstate commerce and be made subject to one body of *Federal* law applying uniformly throughout all of the United States. It will thereby avoid the complications of individual state control which have proven to be such a handicap to railroad and automobile operation.

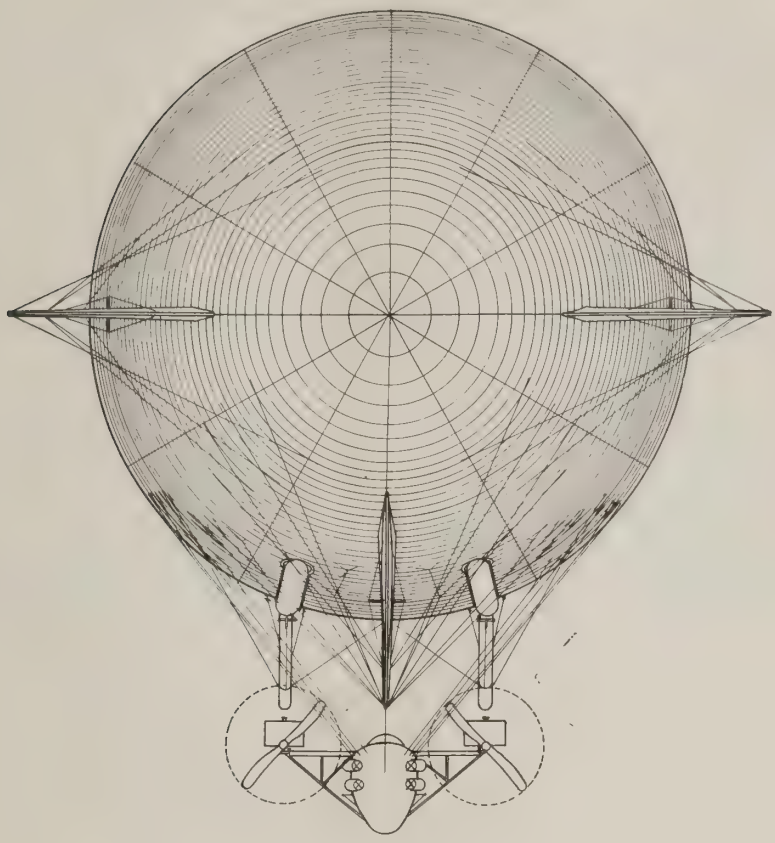
H. Insurance of aircraft and its personnel against all kinds of hazards and risks involved should be encouraged in every way. The cost of such insurance should be kept as low as is consistent with the risks involved.

I. Encouragement should be given to the organization of private enterprises for carying on aerial transportation. This encouragement might well be in the form of payment for the carrying of mail and expressage, and of guarantees as to the volume of such business. Compensation might be paid to such enterprises for keeping their facilities available for use in time of war.

Guarantees of this kind coupled with opportunity to insure against loss by accident should make privately operated transportation lines a commercial possibility, but if it is found that private enterprise does not respond to such encouragement, then the Government should undertake certain transportation ventures on its own account and should continue to operate such lines until they are proven commercially successful. Ulti-

(*Continued on page* 1103)

U. S. NAVY CLASS "C" DIRIGIBLE



STERN

THE C type is the largest of the naval coast patrol dirigibles. It was the C-5, which established the long distance and duration record for American lighter-than-air craft by flying on May 14-15 from Montauk Point to Newfoundland in twenty-four hours and forty minutes, a distance of 970 nautical, or 1,115 statute miles. Unfortunately she was lost from her moorings within a short time of landing at St. Johns.

The C type is 192 feet long, 43 feet wide, and 46 feet high; it has a capacity of 180,000 cubic feet. Cruising speed, 42 M.P.H.; climb, 1,000 feet per minute.

The car is of streamline form, 40 feet long, 5 feet in maximum diameter, with steel tube outriggers carrying an engine at either side. Overall width of outriggers, 15 feet. Complete weight of car, 4,000 pounds.

The envelope maintains its form by means of internal pressure, obtained in the slip-stream of the two propellers through two blower pipes. These discharge into a duct leading to two ballonets. Two water bags fitted forward and aft in the bottom of the envelope aid in the trim control.

Longitudinal and latitudinal stability is obtained by fixed horizontal and vertical fins, and steering in the horizontal plane by a balanced rudder.

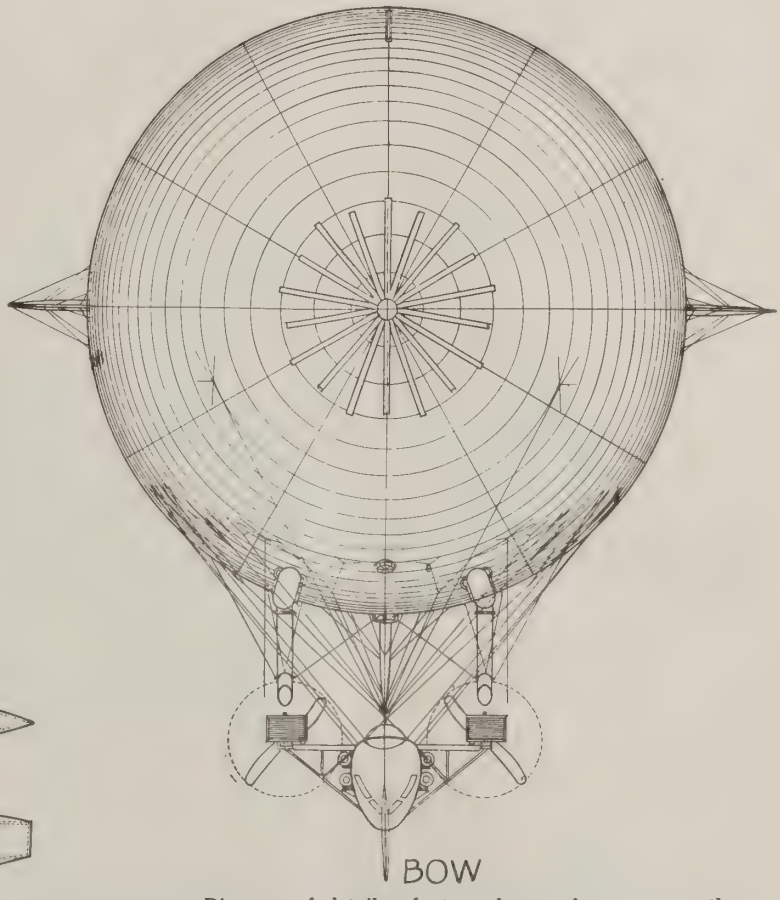
The suspension of the car and tail surfaces is made by patches, some fifty finger patches, each tested to stand a 2,000 pound pull, being required to support the car. Each patch consists of four strips of fabric shaped somewhat like the spread fingers of a hand, which are sewed and cemented to the envelope.

The power plant consists of two Union gas engines, water-cooled, of 6 cylinder vertical type, developing 125 horsepower at 1350 revolutions per minute. Less than ten gallons of fuel per hour are used at a flying speed of fifty miles an hour, while the maximum speed is 60 miles an hour.

These dirigibles are equipped with medium range radio transmitters weighing approximately 250 pounds. The antenna is mounted inside the envelope and is insulated throughout to avoid danger from sparking. A trailing antenna may also be used.

Seven passengers may be carried, but the usual crew consists of four. At the front, the coxswain is placed; his duty is to steer the machine from right to left. In the next compartment is the pilot, who operates the valves and controls the vertical movement of the ship, and aft of the pilot the mechanicians controlling the en-

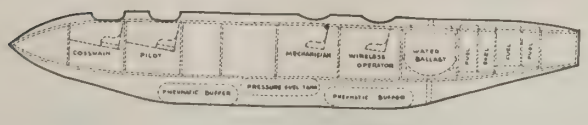
(*Continued on page* 1098)



BOW



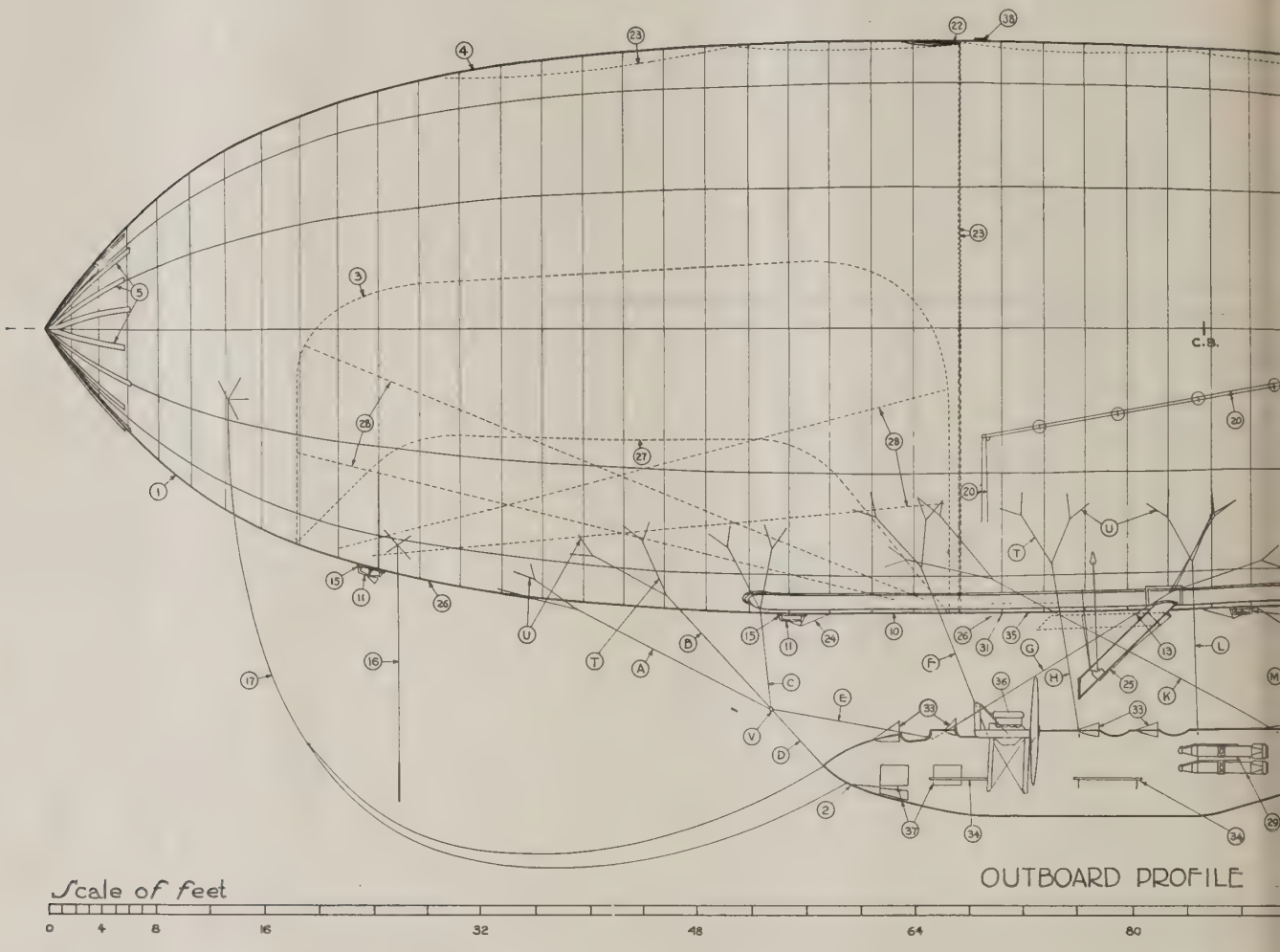
CAR - PLAN



CAR - OUTBOARD PROFILE

Diagram of details of stern, bow and car are on the same scale as the diagrams of profile and plan on pages 1096 and 1097

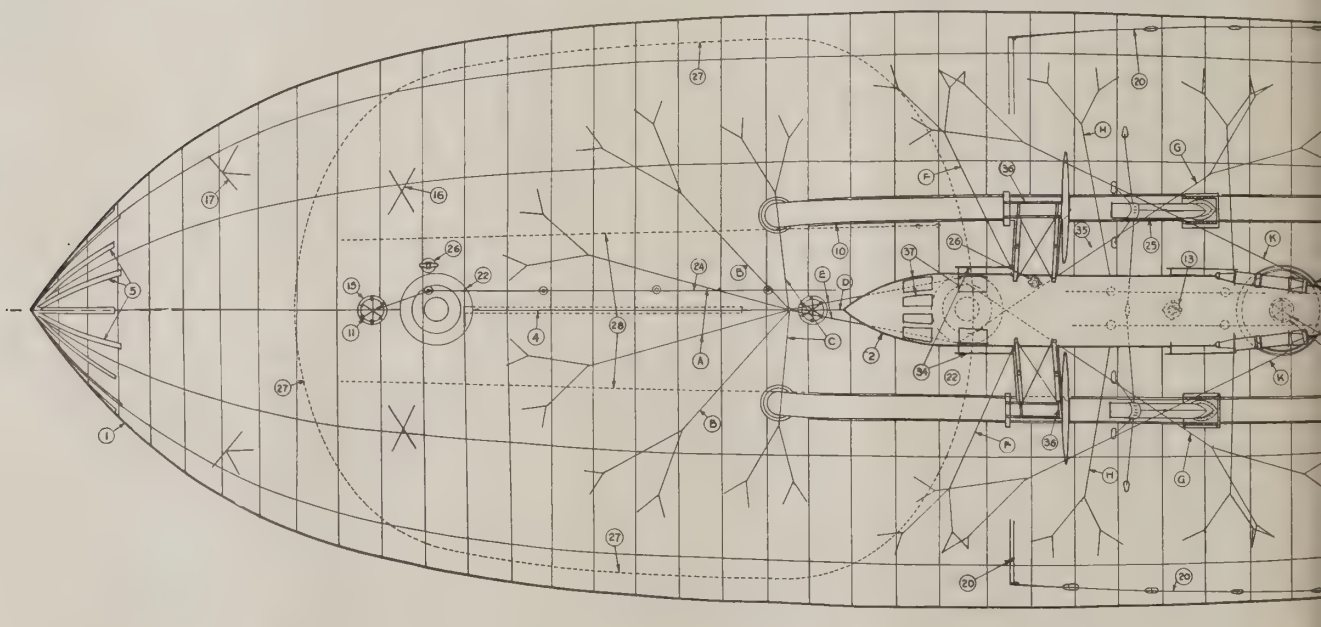
THE U. S. NAVY "C" CLASS N



Scale of feet

0 4 8 16 32 48 64 80

OUTBOARD PROFILE

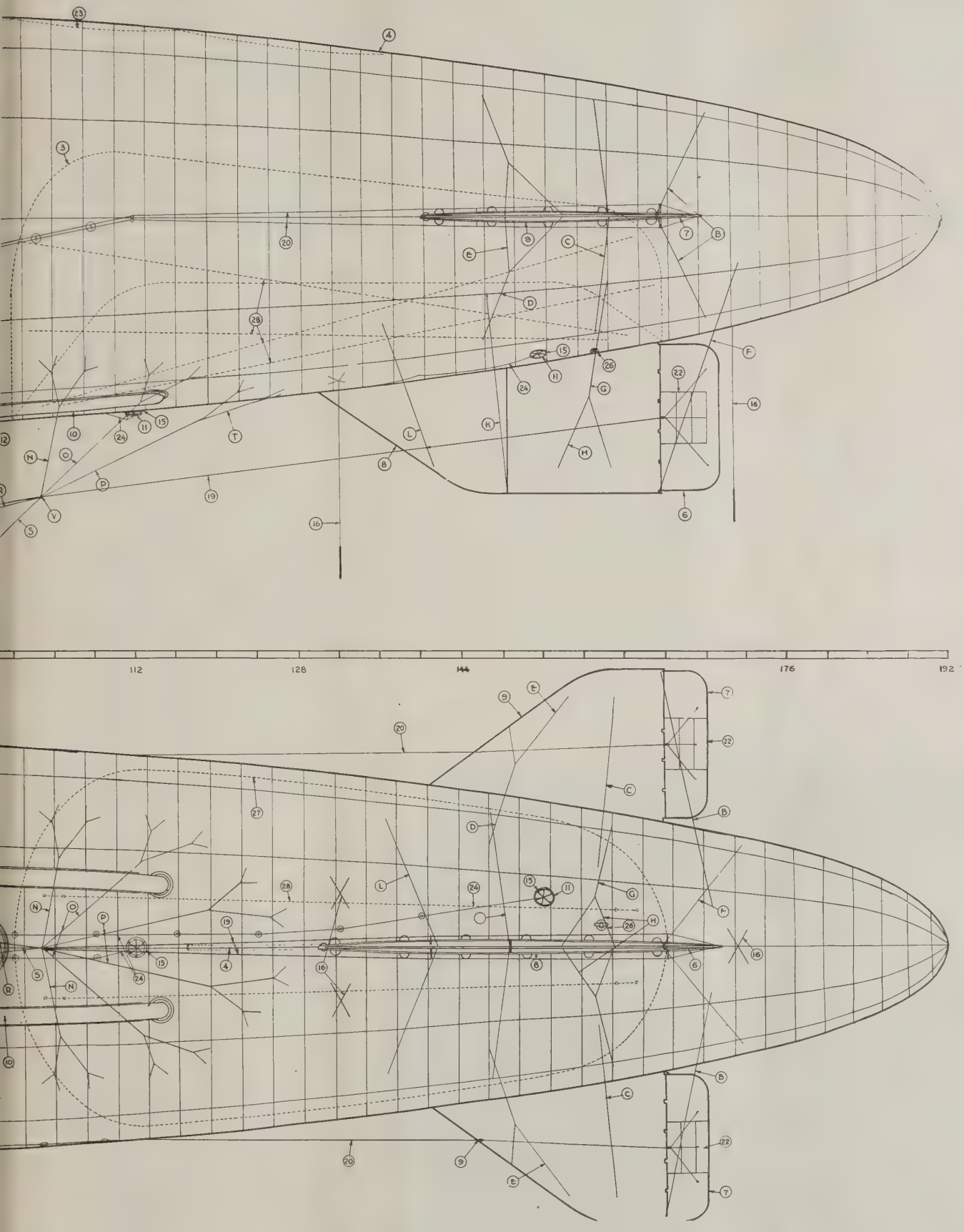


INVERTED PLAN

TABLE OF PARTS

1—Envelope
2—Car
3—Ballonet (2)
4—Rip Panel (2)
5—Nose Batten
6—Rudder
7—Elevator (2)
8—Fin Vertical (1)
9—Fin Horizontal (2)
10—Air Pipe to Ballonet (2)
11—Air Valve (4)
12—Gas Valve (2 @ 18")
13—Inflating Sleeve
14—Gas Manhole (2)
15—Ballonet Manhole (4)
16—Grab Rope (5)
17—Mooring Rope
18—Car Suspension (A to U)

RIGID TWIN ENGINE DIRIGIBLE



-Rudder Lead
-Elevator Lead
-Cord Guide
-Standard Designating Insignia
-Rip Cord
24—Ballonet Valve Cord
25—Air Intake Scoop
26—Window Inspection (3)
27—Ballonet Seam
28—Ballonet Inside Suspension Rope
29—Bombs "Mark V" (4)
30—Gas Valve Apron (2)
31—Pressure Tube Gland
32—Rip Cord Gland
33—Windshield (4)
34—Grab Rail (4)
35—Gas Pressure Tube
36—Power Plant
37—Window (6)
38—Sealed Emergency Valve.

(Continued on page 1098)

gines. At the rear cockpit is the wireless operator.

The general specifications of the C type dirigible follow:

General Characteristics

Length	192′ 0″
Diameter	41′ 9″
Volume (cu. ft.)	182,000
Total lift* (lbs.)	12,700

* { Purity, 98.6%. Temperature, 65 F. Barometer, 30.

	(Lbs.)
Weight, empty	7,940
Weight carried:	
Crew (6) men	1,015
Fuel	3,250
Oil	120
Navigating equipment	25
Radio	250
Food	15
Drinking water	85
Ballast	0
Useful load	4,780

Endurance at 45 M.P.H. { 47 hours, 2,150 miles

Endurance at 55 M.P.H. { 28 hours, 1,540 miles

Maximum speed, 60 M.P.H.
Maximum attainable height, 8,600 ft.
Total power (normal), 250 H.P.
Engine type, Hispano-Suiza.
Engine number, 2.
Fuel consumption per hour, 150 lbs.

Areas

	(Sq. ft.)
Vertical rudder	82
Vertical fin	342
Elevator (2) (total)	118
Horizontal fin (2)	420

	(Cu. ft.)
Volume forward balloonets	26,530
Volume after balloonets	26,470

Center of buoyancy, 85′ 4½″ from nose.



The car of a "C" type dirigible, showing mounting of engines and the blower pipes behind the propeller

Theory of Sprung Tail Skids on Aeroplanes

It is claimed at the outset that attaching springs to the tail skid of an aeroplane is more important than it is usually considered. The skid is attached to the fuselage by means of a pin joint at a joint at a point near its center and the upper end connected with the body by a spring. The oscillations set up when the lower end of the skid comes into contact with the ground on landing are examined from a theoretical point of view. It is supposed for simplicity that the landing wheels are rigidly attached to the ground, the aeroplane being free to move about the axle.

Let O be the point of intersection of the axle and the plane of symmetry, S the C.G., A a point on the fuselage vertically above the lower end of the skid. Also:

$r = OS$.

r_s = the horizontal distance from O to A.

ϕ = the inclination of OS to the horizontal

P = the reaction between the skid and the ground.

T = the moment of inertia of the machine about the axle of A.

G = the weight of the machine.

H and H' are the distances during oscillations above and below A_0. Suffixes 0 and 1 are used to denote the values of the quantities when the machine is in its *zero position* (i.e., when the skid just touches the ground, but does not bear the weight of the machine) and in its position of equilibrium respectively.

The equation of motion about the axle is

$$Gr\cos\phi - Pr_s = -T\frac{d^2\phi}{dt^2}$$

Consider the first oscillation between the zero position and the lowest point reached by A.

If $x = \phi_0 - \phi$ and K a constant depending on the spring,

$$P = P_0 + Kr_s x,$$

and it is found on integrating the equation of motion that

$$x/x_1 = 1 + C\sin a\,(t + t_0)$$

where

$$a = \sqrt{\frac{Gr\cos\phi_0 - P_0 r_s}{Tx_1}}$$

and

$$C = \sqrt{1 + \frac{2Gh}{x_1(Gr\cos\phi_0 - P_0 r_s)}}$$

where h is the vertical displacement of S corresponding to a rotation x.

These equations give the maximum value of x, and hence

$$P_{max} = P_1 + (P_1 - P_0)C.$$

Now $Gh = P_1 H$ approximately, and since the work done by gravity from zero to equilibrium positions is equal to the work done by the spring for the same motion,

$$Gr\cos\phi_0 x_1 = \frac{P_1 + P_0}{2}H'_1, \text{ also } r_s x_1 = H'_1.$$

After substitution, the final expression for P_{max} are obtained, viz.:

$$P_{max} = P_1 + \sqrt{(P_1 - P_0)_2 + 4P_1 Hk},$$

so that the maximum value of P that is likely to occur can be found if P_1, P_0, H, and K be known. In particular, if $P_0 = O$ and $H = o$, i.e., if there be no previous tension in the spring and tail of the machine drops only from the zero position.

$$P_{max} = 2P_1.$$

The equation loses its meaning, of course, if the tail of the machine cannot fall through a distance H_{max} without touching the ground.

Now, substitute $P_0 = P_{max} - KH'_{max}$ in the above equation for P_{max} and solve for H, then

$$H = \frac{2H'_{max}(P_{max} - P_1) - kH'^2_{max}}{4P_1}$$

H_{max} will, of course, have to lie between limits defined in the design of the machine.

The article includes the solution of a few numerical examples where also the length of the skid is considered, and concludes with a remark on the friction between the skid and the ground. (*Oesterreichische Flug-Zeitschrift,* December, 1918.) No. 4555.

Aviators Aid Astronomical Investigations

Arcadia, Calif.—The Smithsonian Astrophysical Observatory on Mount Wilson, under the direction of Mr. L. B. Aldrich, has made some valuable experiments with the assistance of the U. S. Aviation Service at Arcadia, Calif. A special instrument, the pyranometer, devised by Messrs. Abbot and Aldrich, measures the heat from the sun and sky combined, or from the sun alone, or from the sky alone, as it falls upon a horizontal surface. Mr. Aldrich used the pyranometer to measure the reflecting power of the large layer of fog which often covers the San Gabriel Valley, lying between Mount Wilson and the sea. A military balloon acted as support for the pyranometer above the fog, and the results were very satisfactory. The measurements are of much interest to meteorologists in consideration of the temperature of the earth, which is to a large extent covered with clouds.

NAVAL and MILITARY AERONAUTICS

Radio Telephone Concert for New York as All-American Pathfinders Start

New York, N. Y.—Uncle Sam's first aerial transcontinental recruiting expedition, known as the All-American Pathfinders, started from Mineola, L. I., on August 13, and one of the nine aeroplanes in the squadron, equipped with the new wireless telephone system, sent a farewell message and a Sonora phonograph concert from the sky as it passed over the city, to the people of New York.

Co-operating with the War Department, the Adams Aerial Transportation Company had a wireless telephonic receiving set erected in its offices in the *Times* building, with the aerials on the Rialto Theater. This installation was made by the International Radio Telegraph Company, which conducted the receiving end of the unusual demonstration. This company also furnished the Navy Department with the radio equipment used on the NC trans-Atlantic fliers.

A representative gathering of officers identified with the aviation sections of the Army and Navy, as well as many others prominent in the sphere of aviation, were present to hear the farewell message and music from the sky.

The aeroplane equipped with the wireless telephonic outfit was piloted by Lieut. J. E. Adams, while Lieut. C. C. Shangraw was the radio officer. Popular musical selections were sent and Lieut. Shangraw's appreciation of humor and topics of the day was demonstrated when he sent the following message: "I feel like a theatrical manager—I am way up in the air."

The demonstration proved to be a complete success and will be repeated over all of the 171 cities and towns on the itinerary of this great flight from New York to San Francisco.

Forest Patrol Fliers Pass 50,000-Mile Mark

Washington, D. C.—The Director of the Air Service announces that the five forest fire patrols now operating from Mather, March and Rockwell Fields have covered a total of 54,906 miles in 46,436 minutes during the seven weeks' period ending on August 8. In that time 452 flights were made and 91 fires discovered.

The summary of the work is as follows:

WEEK ENDING AUGUST 9, 1919

Squadron	Flights	Miles	Minutes	Fires
Mather Field (Ore.)	28	1,670	1,680	28
Mather Field (Cal.)	28	2,814	3,410	5
March Field (Cal.)	16	1,360	1,010	1
Rockwell F'ld (Cal.)	7	2,686	1,791	1
Total	79	8,530	7,891	35
Total for 7 weeks	452	54,906	46,436	91

Cross-Country Mileage Record Over 60,000 in Week

Washington, D. C.—The Director of the Air Service announces that a new record for cross-country flying was established during the week ending August 8. Army aviators flew 60,482 miles in that period. This mileage does not include flights given in the instruction of enlisted men.

Progress of the Dallas-Boston Fliers

Washington, D. C.—The Dallas-Boston fliers on August 10 had flown a distance of 4,211 miles in a time of 2,698 minutes. On that date a flight from Providence to Albany, 170 miles, was made in 90 minutes. A flight from Providence to Hazelhurst Field and return for supplies was made on August 9, a distance of 300 miles in 168 minutes.

1,000-Mile Inspection Flight in 760 Minutes

San Antonio, Tex.—Two DeHavilands, Lt. Leonard W. Jurden, pilot; Major Bruce B. Buttler, passenger; Commanding Officer of Kelly Field; Lt. Rex Stoner, pilot, Commanding Officer 8th Aero Squadron, and Capt. W. G. Renwick made a flight to McAllen, Tex., on a tour of inspection. Total mileage, 1,000 miles; distance of both ships: time, 760 minutes; altitude, 5,000 feet.

Mechanics Required for Aviation Mother Ship

Mechanically inclined men who desire to go to sea will be accepted for service aboard the U. S. S. Shawmut, the only aviation mother ship in the navy. Lieutenant Myron F. Eddy, flight officer in charge of aviation recruiting in the New York district, announced that the Shawmut is releasing aviation mechanics in accordance with orders received recently, and that the vacancies will be filled by recruits.

The Shawmut acts as tender for ten seaplanes and will be attached to the Atlantic fleet. Four of the seaplanes are carried on board ship. The other six are known as air boats—big seaplanes of the F-5 type. Air boats are flown from port to port, and engage in all fleet maneuvers. The Shawmut will proceed to Newport soon for aerial bombing practice and for seaplane observation of torpedo tests.

99 Per Cent. of Air Service Equipment Ready to Use

Washington, D. C.—The following statement was issued by the statistics branch, General Staff, War Department:

The latest reports from the Air Service show over 4,500 active type planes and over 15,800 active type engines at fields and depots, of which 99 per cent are in condition to use.

In the following tables are shown the status of the planes and engines at the Air Service fields and depots as of June 30, 1919:

	Total	In condition to use	Per cent of total in condition to use
Planes			
Experimental	346	346	100
Active	4,547	4,488	99
Obsolete	1,865	1,854	99
Obsolescent	2,670	2,544	95
Total	9,428	9,232	98
Engines			
Active	15,823	15,788	99.8
Obsolete	2,865	2,822	98
Obsolescent	10,457	10,117	97
Experimental	993	945	95
Total	30,138	29,672	98

Aeroplane Stocks Officers' Club Despite Railroad Strike

Fort Sill, Okla.—The Officers' Club at Fort Sill used aeroplane transport when local meat supplies were exhausted during a recent railway strike. A flight to Oklahoma City was made to procure 125 pounds of meat and a quantity of urgently needed electrical supplies.

The Post Field Aerial Baseball Club were carried in Curtiss planes to and from Marlow, Okla., in order to play a game scheduled there.



The crew of the Caproni biplane which made the successful flight from McCook Field to Ellington Field. Left to right: Mechanic C. L. Wiggin, Lieut H. R. Harris, Mechanic Dave H. Cramer, Lieut. C. H. Wilcox and Mechanic Hoeger Wictum

FOREIGN NEWS

Eight Passengers in Paris-Morocco Flight

Casablanca, Morocco.—The giant aeroplane Goliath, carrying eight passengers, which left the vicinity of Versailles at midnight Sunday, arrived at Morocco on August 11 at 5:40 p. m.

Strong Air Force to Reduce British Expeditionary Forces

London.—Winston Churchill, in urging strictest economy in regard to war expenditures, particularly in connection with the maintenance of expeditionary forces along the Rhine, and in Turkey and Mesopotamia, says:

"The government is making earnest inquiries whether it is not possible by free employment of armored cars and swift tanks and a judicious arrangement of railways and aeroplanes to greatly reduce our armies in these regions." He was hopeful that it might thus be possible to reduce the costly British forces by half.

Mr. Churchill argued, however, against abolishing the framework of the anti-aircraft organization on the ground that no form of attack could more easily or secretly be prepared than an air attack.

Major General J. E. B. Seely, Under Secretary for Air, in the course of his speech made the effective point that the efficient air force had saved the country millions in money and thousands in lives this year in connection with the troubles in Afghanistan and Egypt, where campaigns were carried out at slight cost as compared to the aforetime heavy cost in money and life in similar campaigns conducted by Lords Roberts and Wolseley.

With regard to the air force, Mr. Churchill declared he had instructed Major General Sir Hugh Trenchard, chief of the Royal Air Staff, that he must provisionally frame his scheme within the limits of twenty-five millions yearly, which was equivalent to about twelve millions in pre-war days.

The estimated appropriation for the air force of £66,000,000 ($330,000,000), the General added, was necessary to clear up war contracts.

D'Annunzio to Attempt Rome-Tokio Flight

Rome.—The *Popolo Romano* states that Gabrielle D'Annunzio will shortly start a flight from Rome to Tokio via Asia Minor, India, Tonkin and China. The flight is expected to take fourteen days.

Ban on Civilian Passenger Carrying Between London and Paris Lifted

London.—The Air Ministry announces that:—

For the purpose of taking part in the Peace Celebrations during the forthcoming week, in Paris and London, arrangements have been made with the French Government for the opening of Civil Communication by air between London and Paris, from July 13th-20th inclusive.

British machines visiting Paris will land at Le Bourget only, and French machines visiting London at Hounslow only, except in emergency.

All machines will cross the French coast between Calais and Boulogne, and the English coast between Folkestone and Dungeness.

All machines taking advantage of these facilities must be provided with, and carry, certificates of airworthiness, issued by their respective Governments.

Passports will be carried by all civilian personnel.

A full list of passengers showing their destinations will be carried by the pilot in charge of the machine.

No goods or merchandise may be carried.

It is to be clearly understood that during the week this temporary arrangement is in force, no machine will, in any circumstances, fly over Paris.

3,700-Mile Tour in Aerial Limousine

Paris.—According to the *Daily Express,* Jean Galmot has completed a 3,700-mile trip around France in an aerial limousine carrying six passengers. Many stops were made at historic points along the journey.

The London-Brighton Week-End Service

London.—A regular week-end service between London and Brighton has been inaugurated by the Avro company, leaving London Friday and Saturday and returning Monday. The charge is £5 one way and £7 10s return trip.

Aerial Patrol Discovers Secret Meeting

Belfast—An aeroplane making a "patrol flight" recently between Novan, on the east coast of Ireland, and Armagh, observed Sinn Feiners holding a meeting which had been forbidden.

The fliers reported and military police arrived as the meeting terminated. They arrested two men amid great excitement. The prisoners were later released.

Flies Through Arc De Triomphe

Paris.—Lieutenant Godefroy, a French aviator, performed, on August 7, the remarkable feat of passing under the Arc de Triomphe in an aeroplane flight.

Godefroy flew a machine with a wing-spread of 24 feet, which left him a margin of about 21 feet to get through the arch. He cleared the opening cleanly, gliding through with the motor stopped. After clearing the arch he turned on the power again and flew over the Champs Elysee. Exhibitions of motion pictures showing the flight under the Arc de Triomphe were prohibited by the police on the ground that the flight was made contrary to police regulations and was likely to encourage other dangerous feats.

The Prefect of Police asked the newspapers not to reproduce photographs, but they ignored the request. Managers of the motion picture theatres said they hoped Premier Clemenceau would permit the motion pictures to be shown.

Schneider Trophy Competition in September

The Jacques Schneider international trophy, last won by C. Howard Pixton in a Sopwith baby seaplane at Monte Carlo in 1914, will be competed for on Wednesday, September 10th, at Bournemouth. The water course will be over a circuit of about thirty miles, starting from Bournemouth and taking in Swanage and Christchurch. The distance this year will be 200 nautical miles instead of 150 as in 1914.

25,590-Foot Altitude with Passenger Claimed as World's Record

Paris—Maurice Walbaug, flying in an areoplane with one passenger aboard, claimed to have established a world's record on August 9th by reaching an altitude of 25,590 feet (7,800 meters).

London Flying Club Has Auspicious Inaugural

London, Eng.—The London Flying Club recently opened its clubhouse. There is a hall large enough to accommodate 2,000 members and with 50 sleeping rooms and an aerodrome of eighty acres where it is intended to maintain aeroplanes for the use of members, either for solo flying or as passengers in parties. A flying school for the teaching of aeronautics will be maintained.

The president is Lord Lonsdale, and the vice-presidents include Lord Willoughby de Broke, the Duke of Rutland, the Marquis of Cholmondeley, Viscount Curzon, Sir Arthur du Cros, Lord D'Abernon, Lieut. Gen. Sir David Henderson, Lieut. Col. Cecil Grenfell, Major Gen. Sir John Seely, Admiral Sir Edward Seymour, and Lord Ribblesdale.

The Ritz Hotel is the London headquarters, and between the two a service of cars for the benefit of members will be maintained. The annual dues are 10 guineas, but present or retired officers of the Royal Air Force have membership privileges for 5 guineas.

Royal Jewels to Sweden by Aeroplane

The Copenhagen correspondent of the Central News reports that the police of Malmoe, Sweden, are holding two packages of jewels and securities dropped from an aeroplane and which they believe to be the property of the former royal family of Saxony.

Coast guards saw the packages dropped from the aeroplane. They were picked up by two Germans, who claimed the valuables as their property. The police are investigating.

Mexican Air Service Growing

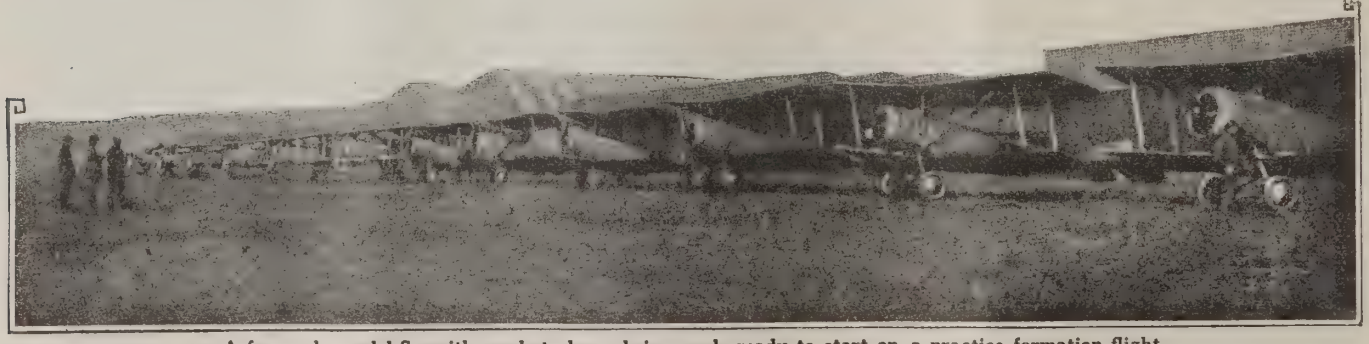
The Mexican Army Air Service has been gradually growing until it now numbers 500 aviators in various stages of training, while there are 6,000 applications on file. Colonel Alberto Salinos is chief of the Service.

Rice Growers of Colusa Employ Aeroplane Patrol

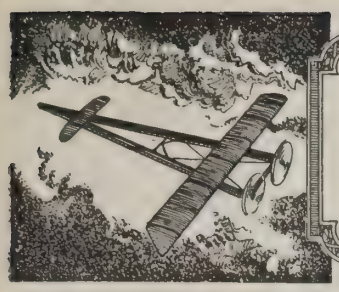
Rice growers at Colusa are contracting with a local company for an aerial patrol to protect 15,000 acres of rice from the ravages of ducks, geese and mudhens. It is believed the regular flight of aeroplanes over the fields at low altitude will so frighten the birds that they will leave for other parts.

Details of Turin-London Flight

London—Further information regarding the Turin-London flight, completed on July 16 by Lieutenant Brack-Papa in a Fiat B. R. biplane, accompanied by Lieutenant Bonaccini, is now available. The 225-mile distance from Paris to the Kenley Aerodrome was completed in one hour and three-quarters. On the previous day it had travelled from Rome to Paris (687 miles) in a little over seven hours, despite unfavorable weather conditions. Some days before the machine had been flown from Turin to Rome, doing the 362 miles in 2 hours, 15 minutes, an average speed of 161 miles an hour. This beat the record for this journey, the previous best having been 2 hours, 50 minutes, made by Sergeant Stoppani on a Sia machine.



A few early model Sopwith combat planes being made ready to start on a practice formation flight



ELEMENTARY AERONAUTICS and MODEL NOTES

By John F. McMahon



NOW that the Aerial Age contests are over, the model flyers of the United States should not let their work slide. Instead, they should keep building and flying models, both the racing type and the scale models, as we have promises from many influential men in the aircraft industry and other enthusiasts, that they will offer prizes in the near future. This should be given due consideration together with the fact Aerial Age will offer prizes again as soon as popular interests in models is proven by the model flyers themselves.

The rubber strand driven model has been the standard for years, but like every other mechanical contrivance, the model aeroplane must advance with the times and other forms of motive power should be experimented with and put to practical test to find something that will fly a model for at least one minute.

Many different types and kinds of motors other than rubber bands have been tried; the best so far have been compressed air and steam. Steam engines are complicated as the pump arrangement must be so designed and timed as to pump water into the boiler only as fast as it is turned into steam and used up in the cylinders. The pump generally pumps too much or not enough water, and the result is that the boiler gets cold from the excess of cold water, or it dries up in account of not getting enough. However, many successful steam motors have been tried, especially in England, with good results. Mr. Groves is the leading steam engine builder in the model aeroplane game.

The compressed air motor is less complicated and while it works on much the same principle as the steam engine, it is easy to construct and far easier to operate. The next contests will have one event for engine driven models. Points will be awarded in proportion for the type of engine used, whether compressed air, steam or gasoline. The last mentioned is out of reach of most model builders as it is necessary to have a lathe and other machine tools to manufacture it. The compressed air motor, on account of its simplicity, will be the most popular, no doubt, and the writer is in hopes that the existing record for a model powered with this type of motor will be broken.

Four years ago the writer had the pleasure of successfully flying a model rising from the ground and sustaining a flight of twelve seconds duration. This model had a twin cylinder compressed air motor and the flight was made at Highland Park, Brooklyn, N. Y. Later flights of longer duration were made at Wading River, L. I., for the benefit of the Wading River Mfg. Co., who purchased the rights to make and sell these motors.

As far as can be ascertained, these were the first successful flights in this country for models with compressed air motors. Later contests were held by the Aero Science Club of New York City, and records of 30 seconds were made with a model having a foreign engine.

The Wading River Mfg. Co. carries a full line of compressed air motors and plans for building. Their address can be found in the advertising columns of this paper.

To make a compressed air motor, it is necessary to have a sheet of .008" thick bronze 13" x 18" if wrapped straight, or 6" x 28" if wrapped spirally. This bronze is then wrapped around a former of wood and the laps of metal are soldered. Before putting on the ends, thin steel wire should be wrapped around the outside every ⅛" to strengthen it, after which the end caps are soldered on. These end caps can be purchased at any hardware store. Simply ask for curtain rod balls 2½" in diameter and split them in half. The outside half is the one used. A bicycle valve is used for holding the pressure, as well as a connection for the pump. This is soldered into place in the center of one cap. In the other, a gas cock is soldered for opening up pressure when ready to fly.

The engine cylinders are made up from fishing rod ferrules or brass tubing 1/32" wall, the pistons are of fibre, turned to fit the cylinders and tight enough to hold pressure and still move freely up and down. A rotating valve is made from a taper pin, and is so notched that it distributes the air as the crankshaft is revolved. In fact the crankshaft is nothing but a rotating valve, and by this arrangement much weight is saved.

Before the writer designed this style of open crank, having a crankshaft acting as an open air distributor, compressed air motors weighed as much as three ounces—the one mentioned above weighed 1⅛ ounce. The tank weighed but 7½ ounces, the complete model 15 ounces, and it had a wing spread of 52 inches. The surface was large for such a small machine, but it was necessarily so to insure success.

Complete data have appeared in previous issues of Aerial Age regarding compressed air motors, and for those who wish to get specifications of these particular motors should write to our Subscription Department for back issues of Aerial Age, and get your order in for the next issues which will contain valuable information to the model builders.

BOYS—ATTENTION

In order to keep up-to-date with the news of the "Model" world, you will want to receive a copy of AERIAL AGE every week, and because we realize that $4.00 seems a lot of money for some boys to spend at once, we have a very attractive offer to make. Write to us, addressing the Circulation Department, and we will tell you all about it.



Four members of the victorious Illinois Model Aeroplane Club team that won the Villard Cup and Aerial Age prizes. The names reading from left to right are: Lucas, Schweitzer, Jaros and Pease



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Taking Them Over

"Yes," said the little man in the train, "I'm glad the war's over; I could do with a rest."

"Ah! done your bit, you 'ave," said an old lady in the corner. "You're in the Air Force. Been at the Front?"

"Yes, mum, and I took over a thousand aeroplanes over the lines."

"Some aviator," interrupted one of the passengers.

"No, sir," replied the talkative one, "I'm some photographer."—*From Aircraft.*

Precocious

Willie crashed his father's 'plane
Right through the front room window pane,
His father said, like one perplex'd,
"That youngster will be smoking next."
—*From Aircraft.*

Piker

"Macdougal is a bit close, isn't he?"

"Close isn't the word! He'd rather stay up an extra hour than come down and wear out the tires on his undercarriage!"
—*From Aircraft.*

Aboard the Trans-Atlantic Dirigible

A woman and he daughter were flying across the Atlantic during a terrific storm. After a silence of some time the mother asked:

"Are you seasick, dear?"

"No, I think not, mother," replied the girl, "but I'd hate to yawn."—*Awgwan.*



The arrival of the 6:15 express from Europe, by Ding in the "N. Y. Tribune"

A Bad Landing

Winsted, Conn. (from a press dispatch)—Hugh Rockwell, an aviator, of Plainville, is all "done up" as the result of his monoplane's landing in a colony of bees on August 4.

Before the aviator extricated himself from his wrecked machine he was attacked by hundreds of bees and stung in the face, neck, ears and parts of the body.

The engine, a light two-cylinder one, behaved splendidly until the last moment, but while nosing to the field the connecting rod in the cylinder broke and the plane came down, knocking over a swarming beehive.

Oh, death, where is thy sting!

Her Aeroplane Sermon

Grandmother there hears the engines of air—
  Sees the aeroplanes sailing by;
Sailing by and out of sight,
Under and over the rainbows bright,
  Higher than home birds fly!
Sailing on, through the dark and dawn,
And then like the light o' the rainbow—gone!

"It's the miracle time,
  That I've lived to see—
Man, like the wild birds,
  Flying free—
  God's good to you and me!"

Over the city the birdman's wings
  Hover and dart and seem
Like shadows—they say—
Now of gold, then of gray,
  Shadows you'd see in a dream.
And they fly to the east, and they speed to the west,
And the storm drives them home, like birds to the nest!

"It's the miracle time,
  Where the great wonders be,
But God's love is greatest,
  And that's all we see—
  God's good to you and me!"
—*Frank L. Stanton in The Atlanta Constitution.*

In a Military Manner

A reporter, in a camp where a number of negro troops were being discharged, asked one of them what he was planning to do when he got his release.

"Boys," said the negro, "the fust thing after Ah gets mah discharge, Ah goes and busts mah second lieutenant on the nose."

"Oh, no you ain't, nigger," spoke up another, "you is gwine to git in line and take yo' turn."—*American Legion Weekly.*

Can't Get Along Without Them

"Why is an airship unlike the Bolsheviks?"

Because it can get along successfully in spite of its propeller's "revolutions."—*Aircraft.*

(*Continued from page* 1094)

mately they should be sold to private enterprises on such terms as would permit of successful operation, as it is not believed that commercial aviation will ever be successfully developed under Government control.

J. The remaining aircraft production industry should be conserved and kept in a healthy condition by a well defined and continuing program of production for military purposes, over a period of years. This policy should be continued until the commercial demand is adequate to support an industry of sufficient proportions to form an effective nucleus upon which can be built a war time production in case of need.

Technical Development

With reference to technical development, your Mission in submitting its recommendations bases the following conclusions on a knowledge of conditions existing in the United States and upon extensive investigations conducted abroad:

1. (a) The Mission visited plants making or experimenting in materials as follows:

France—Breguet, Bleriot, Renault, Farman, Hispano-Suiza, Nieuport, S. P. A. D., Morans-Saulnier.

Italy—Ansaldo, Macchi, Caproni, Pomilio, Isotto (plant closed by strike), F. I. A. T.

England—Handley-Page, B. A. T., Rolls Royce, Phoenix Dynamo, Bristol, Vickers-Vimy, Cosmos, Sopwith, Grahame-White, A. B. C., Armstrong-Whitworth.

(b) The Mission has visited laboratory and experimental shops as follows:

Institute Sperimentale Aeroniutico, Rome.
Eiffel Laboratories, Paris.
R. A. F. Factory, Farnsborough, England.
Isle of Grain Naval Experimental Station, England.
Pulham Dirigible Station, England.
Aeroplane Station, Contocelli, Italy.
Dirigible Station, Craspiano, Italy.

(c) The Mission has interviewed the following Governmental official and industrial officers upon the subject of the proper organization, scope and equipment of the Technical Division:

England:

General E. L. Ellington, Head of Department of Design, London, Royal Air Force.
Sir Percy Herouard, Managing Director, Armstrong-Whitworth Company, 8 George Street, Westminster London.
General Graves, R. A. F. Representative, with British Peace Commission, Paris.
General Brooke-Popham, Director of Research, London.
Mr. Holt Thomas, London.
Mr. Douglass Vickers, Vickers Ltd., London.
Mr. Grahame-White, Grahame-White Aircraft Company, London.
Sir Samuel Waring, London.

France:

Major d'Aiguillon, Interministeriello de l'Aviation Civile, Paris.
Mr. Louis Breguet, Manufacturer, Breguet et Cie, Cic des Messageries Aeriennes, Paris.
Mr. Cacquot, Former Chief Technical Section, Dept., Military Aeronautics, Paris.
Colonel Dorand, Department Military Aeronautics, Paris.
General Duval, Director Military Aeronautics, Paris.
Mr. Jacques Louis Dumesnil, Deputy, Former Under-Secretary French Aeronautics.
Captain del 'Estrade, Technical Service, French Military Aeronautics.
Mr. Pierre Etienne Flandin, Deputy, Former Chief Inter-Allied Organization of French Aeronautics, Paris.
Mr. Messaguer, Head of Hispano-Suiza Co., Paris.
Mr. Maurice de Saint Blanchard, Sec'y Aero Club de France.
Mr. Daniel Vincent, Deputy Director, Former Under-Secretary of Aviation, Paris.

Italy:

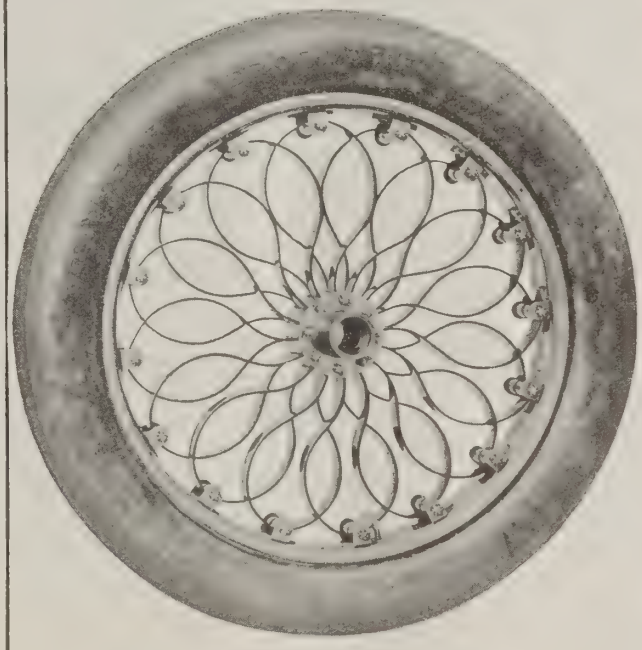
Commander Caldara, Head of Aviation, Technical Section, Rome.
Signor Casati, Designer, Caproni Co., Milan.
Lt. Col. Ferduzio, Designer of S. V. A. Rome Aeronautics, Rome.
Colonel Crocco, Director of Institute Sperimentale.
Colonel Guidoni, Italian Aeronautical Mission.
Admiral Orsini, Ministry of Italian Aviation, Rome.

2. The form of technical organization and control recommended by your Mission differs materially from the controll-

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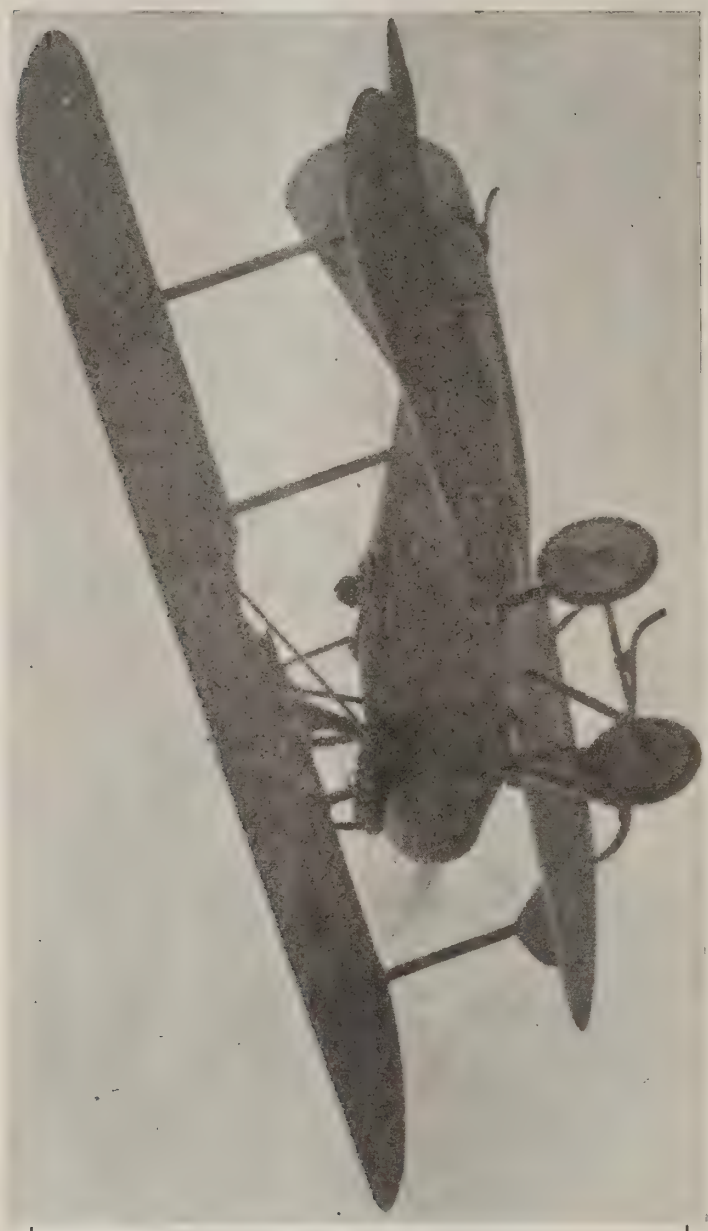
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ing organizations in Italy, France or England. Inasmuch as for some time at least military, naval and departmental flying seems likely to lead in the development of the art, your Mission desires to lay emphasis upon the necessity of having these departments strongly represented in the operations of the Technical Division so that they shall be materially helped and not hindered in their research, experiment and development. To the same end we are of the opinion that lighter-than-air, which in England and France, due to the closeness of the war, the Technical Division is at present dominated by military personnel, but the opinion is unanimous that as time goes on civil personnel will supersede military in this division. General Ellington, England, expressed this opinion flatly and General Brooke-Popham, Director of Research, England, holds the same belief. In the Royal Aircraft Factory, at Farnsborough, civilian requirements are already overtaking military and naval. It has therefore been deemed wise to take the ultimate step at the outset in America, and a civilian head, of the type now earnestly sought in France and England, is recommended for America.

3. In equipment and personnel England and France and Italy are maintaining their war strength in the Technical Division. At Farnsborough we found a complete experimental plant, employing about 3,000 men and women and carrying on actively nearly every line of research, experiment and development in motors, planes and accessories. More than a score of planes, rigged with apparatus for aerodynamic experiment, were in the hangars and in the field. Physical and chemical laboratories seemed busy and fully manned. Estimating the lighter-than-air and the naval experimental and research personnel, it seems probable that the plant and the personnel engaged in the division in England is nearly, if not quite, equal to the entire trade in America at the present time. Obviously this branch of aeronautics lies at the very foundation of the future, both military and civil, and to fail to bring it up to the standard of the world cannot help but mean dependence and mediocrity or worse in aeronautics in America.

4. The inclusion of such topics as armament (Ordnance), wireless (Signal Corps), instruments (Admiralty), photography (Signal Corps), design and bombs (Ordnance), etc., has been found necessary in all countries. In reality the design and supply of such appurtenances is left to the departments or bureaus specializing in them, but research and experiment and development in methods of installation and use is essentially a function of the Air Service Technical Division and must be carried on by this division, both in the laboratory, on the factory floor and especially in the air, in the tank and on the field.

5. In all the European countries visited we found that access to and use of the Government owned facilities for development is established. The basis of such use varies and can be adapted to the circumstances. In all countries, however, the principle is the same, namely that private interests must obtain access to Government facilities, through the officers of the division, so that new inventions, etc., shall pass the scrutiny and criticism of the division heads before going into actual experimentation. In England an attempt has been made to furnish facilities at cost, but to save overhead, a schedule of flat prices is being worked out.

6. In England and France the question whether or not to design complete motors and machines no longer exists. France was forced to design aeroplanes in 1916, due to the failure of her private firms to meet the crisis created by the Fokker; but the immediate result appears to have been a quick return to the safer measures for encouraging the private designers to design and build, under the direction and assistance of the State. In England the complete design of aeroplanes ceased with the SE-5, and both Government officials and industrial officers offered ample testimony that the making of complete designs was a mistake and would not be repeated, due to its effect upon the private design departments. Without exception the manufacturers appear to take the view that it would be idle to compete by private efforts if one division of the Government was designing and another division buying, as the Government would inevitably favor its own designers, even though not quite so good. The result of such a policy, therefore, would be to limit the number of sources from which useful designs can be obtained, and also to lower the standard of personnel in the design departments of private firms.

7. In 1918 Sir Arthur Duckham, then Director of Aircraft Supply for England, said:

"As we all know changes in design, unless they are actually for new types, may be absolutely against production; most of our delays in production in this country and in the countries other than ours have been due to the effort to obtain too great perfection at too early a time."

Having this in mind and having in mind also the disastrous effects upon production of similar causes in the United States, your Mission asked explicit questions concerning the plan

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FIRE—AUTOMOBILE—TORNADO—EXPLOSION—RIOT AND CIVIL COMMOTION

used by the Technical Division in England to minimize the result of such changes. The method is outlined as follows:

"All changes made necessary by the fact that a machine or motor is dangerous to the flier or to the public are classed as Number I. These are imperative and are ordered by the Director of Design, without delay. No machine is allowed to be accepted or flown without such changes having been made.

"Important changes involving improvement in performance, etc., are classed as Number II. Such changes are made by order of the Modification Board described below, and became effective only at such time as not to interfere unduly with production.

"Improvements and additions, not vital but often valuable, are classed as Number III. They are made when convenient, both to Government and to Contractor, and are not allowed to interfere with production or greatly increase price."

A Modification Board shall pass on changes and classify them. This board consists of five members, one from the Technical Division, one from Production, one from Operations, one from Finance and one from Supply. In the case of Number I changes the Director merely reports that such and such changes have been ordered. All other changes are ordered by the Modification Board at regular meetings.

Your Mission is of the opinion that the establishment of some such uniform practice, covering not only such changes but also the method of paying for them is essential to production and should be a responsibility of the Technical Division.

Recommendations

(a) That all technical functions of the Government in respect to aeronautics be centralized in a single Technical Division which shall perform the work for the Army, Navy and Civil aviation; and which shall be headed by preferably a civilian of wide executive experience. Such a division should include as Assistants to the Director experienced representatives of Army, Navy and other Government departments interested in aviation who shall be nominated by the departments and shall act as advisers upon the special needs of the service they represent.

(b) That steps be taken forthwith to secure for the United States the most advanced equipment for research, experimental and development work and for the testing of motors, planes, balloons, etc., for the testing of materials; for the examination and testing of aeronautical appliances, including armament and instruments; and that such an organization shall be established as shall assure at all times that the research, experimental and development activities of the Government shall be second to none.

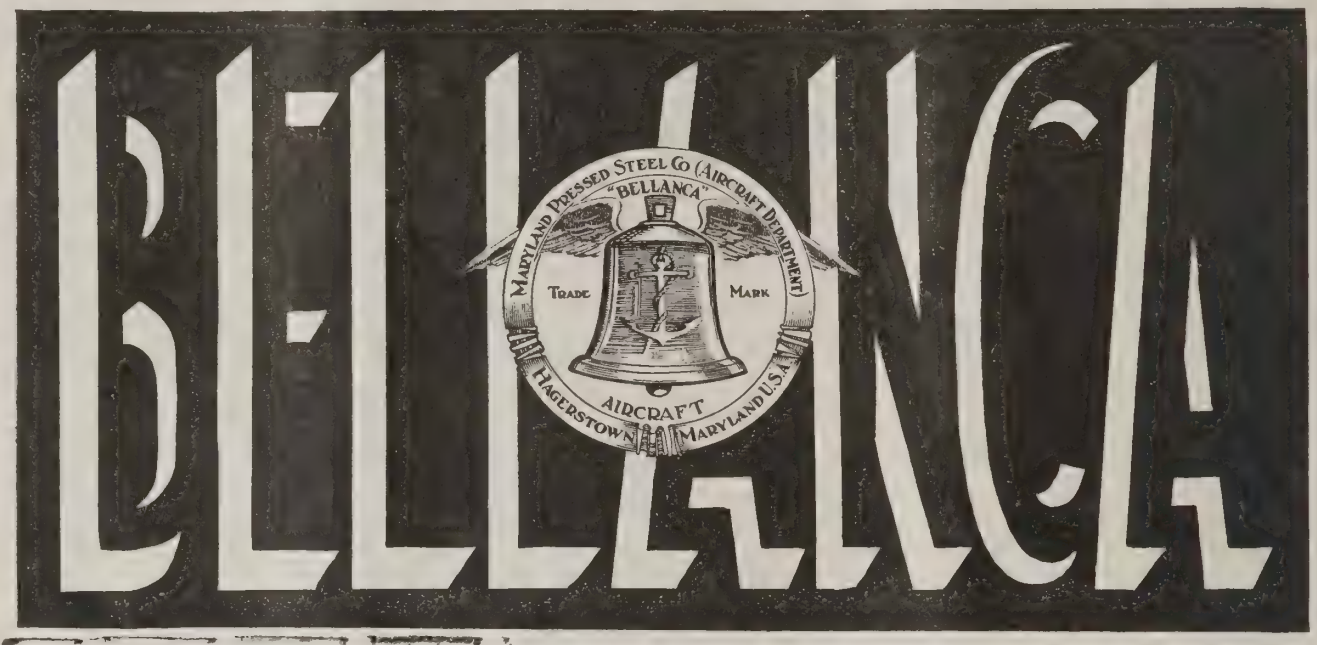
(c) That the research, experimental and development facilities and equipment now used in aviation by the Army, Navy and other Government departments be inventoried immediately and put, as far as practicable, under the control of the Technical Division, retaining such of same as may seem suitable and bringing them under a central control to make a complete and efficient equipment and discarding such of them as unnecessarily duplicate others or are out of date. In making this change great care should be exercised to guard against measures which might tend to interfere with suggestions for improvements and advances in aviation, material and methods, coming from the operating aviation branches of the Army, Navy and Postal Departments. Experience has proved that the initiative in the advance of motors, planes and accessories often comes from practical experience in the flying field, rather than from the scientific department of aeronautics. The Technical Division will, in cooperation with the operating forces, study, work out and apply all such suggestions. Care should be taken also to avoid duplicating facilities already in existence, such as water tanks, armament testing grounds and many other items operated by existing departments. Arrangements should be made whereby the existing plants of this sort can be used on a proper payment basis by the Technical Division.

(d) That extreme care be taken in such a process of adjustment to provide ample means whereby the special technical needs of the (a) Army, (b) Navy and (c) Civilian flying shall receive attention. Means should also be provided whereby military and naval experiments of a secret nature can be carried forward.

(e) That the organization of the Technical Division cover by means of adequate personnel and equipment all branches of aeronautical research, experiment and development, including the application and aerial use of instruments, armaments and munitions, wireless telephone and telegraph, bombs and fittings, sights, fire fighting apparatus, parachutes, air bags and other safety devices, motor appliances for air service, propellers and photography.

(f) That all the technical facilities of the Technical Division for aviation, whether now existent or to be created, shall

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be available to private inventors and designers upon proper and reasonable terms.

(g) That in view of the experience of England and France it is dangerous to allow the Technical Division to operate under normal or war conditions a department of complete design in heavier-than-air machines or in motors, as such competition results immediately in stopping private departments of design. The Technical Division, therefore, should be a critic of and supplementary to private design rather than aim at design on its own account. The policy of the Technical Division should be to maintain and encourage a considerable number of well-manned and well-equipped private design plants and to cooperate with these plants in all undertakings that meet with the approval of the Technical Division, and to place orders with these plants at fair prices for design and for experimental construction of motors, planes and appliances. Competition of the Government with the industry should be avoided; the only allowable exception being cases where, either on account of expense or for other cause, the Technical Division cannot obtain needed material or design from existing sources.

(h) That careful thought shall be given to the establishment of competition in motor, plane, balloons and accessory design, and encouragement be offered in every reasonable way to the promotion of competitive events and the establishment of standard records.

(i) That the Technical Division shall publish regularly and under competent management all the technical facts and data developed by the division that may be helpful to the industry, reserving at the same time to itself the right to preserve secrecy in all matters that are deemed to be in the nature of Naval or Military secrets.

(j) That such a Technical Division shall maintain at all times as close touch as possible with the development abroad and shall maintain representatives in Europe charged with the duty of liaison between the American and European technical organizations.

(k) That a definite method of payment for independent design, experimental production, changes in design, alterations and adjustments be worked out by the Government as quickly as possible to the end that the design and improvement of motors, planes, balloons and appliances may be stimulated and not stifled.

(l) That the Technical Division shall include an Inspection and Testing Department, which shall carry on all inspections and tests of experimental construction and revision, and which shall issue certificates of air worthiness for all machines for private and commercial use, and shall, from time to time, inspect all machines and appliances, including landing fields, signals, etc., used by the public. In cooperation with the Civilian Division, this department shall have power to limit and control all types of air machines used in commerce, and to test such machines before they become production models. This department should have power to examine the inspection methods of all private concerns building aircraft, and to pass upon the quality of such methods from time to time.

(m) That close cooperation be maintained at all times with the purely technical aeronautical bodies, and also with the industrial bodies engaged in aeronautics so that standardization of materials and practices may be carried forward as rapidly as can be done without hindering the development of the art or entailing undue losses upon the trade.

Respectfully submitted,

BENEDICT CROWELL, the Assistant Secretary of War.
HOWARD C. COFFIN, Member of Council of National Defense.
HENRY C. MUSTIN, Captain, U. S. Navy.
HALSEY DUNWOODY, Colonel, Air Service, U. S. A., Assistant Chief, Air Service, A.E.F.
JAMES A. BLAIR, JR., Lieut. Col., General Staff, U. S. A.
GEORGE H. HOUSTON, Pres. Wright-Martin Aeroplane Corporation.
C. M. KEYS, Pres. Curtiss Aeroplane & Motor Corporation.
S. S. BRADLEY, Manager, Manufacturers' Aircraft Association.

*NOTE: Subject to memoranda 1 and 2, July 19, 1919.
R. M. S. "Aquitania," July 19, 1919.

Memorandum No. 1.

Subject: Report of the Organization Committee, American Aviation Mission.

1. I concur with the report of the Organization Committee of the American Aviation Mission, to which I have affixed my signature, with the following reservations:

(a) Provided that the personnel employed in Naval Aviation operations shall be composed exclusively of officers and

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Our Freighter and 12-Passenger Airplane soon to be announced

THE GLENN L. MARTIN COMPANY
CLEVELAND

Contractors to the United States Government

enlisted men of the Navy, Marine Corps, Naval Aviation Reserve and where required for shore establishments of civilians under the employ of the Navy.

(b) Provided that all advanced training of Naval Aviation personnel excepting advanced aviation engineering courses shall be under the direct control and supervision of the Navy.

(c) Provided that when officers and enlisted men of the Navy, Marine Corps or Naval Aviation Reserve are detailed for duty with the proposed Air Department they shall retain their Naval or Marine Corps ranks and ratings.

(d) Provided that administration and operation of all Naval Aviation forces shall be under the direct control of the Navy.

(e) It is recommended that the question of including in the proposed Air Department an offensive Air Force independent of the Army and Navy be left open, pending further investigation of this subject; and that the subject be investigated without delay by the Mission in conference with Army and Navy representatives who have made a special study of military and naval strategy.

(Signed) HENRY C. MUSTIN, Captain, U. S. N.

R. M. S. "Aquitania," July 19, 1919.

Memorandum No. 2.

Subject: Report of the Development Committee, American Aviation Mission.

1. I concur with the report of the Development Committee, to which I have affixed my signature, with the following reservation.

(f) Provided that nothing in the organization of the proposed Air Department shall restrict the Navy in the following activities:

(a) Maintenance of an organization adequate for the preparation of general specifications, general plans and characteristics of the aviation mechanisms, accessories and equipment required for Naval purposes.

(b) Maintenance of an organization and facilities adequate for carrying on experimental aviation work of a class that is exclusively of a Naval character, and that does not involve duplication of efforts and facilities in the proposed Air Department that are common to other aviation branches.

(c) Maintenance of an organization and facilities for conducting the acceptance and tactical tests of complete aviation mechanisms and accessories.

(Signed) HENRY C. MUSTIN, Captain, U. S. N.

The Liberty Caproni Biplane

(*Continued from page* 1091)

altitude adjustage are controlled by means of extra-flexible Bowden cables. The radiators (Rex Manufacturing Co.) are two for each engine and work in parallel.

Each engine has its own oil tank with oil radiator (of corrugated copper sheet) and by-pass, so that in cold weather the radiator can be excluded from the circuit.

The diameter of the propellers is 9′ 6″; the pitch, 6′ 6″. R.P.M. on the ground, 1,480.

Engines are inclined at a 2° angle.

Gasoline System

The gasoline is supplied by six tanks, disposed two in the nacelle and two in each fuselage. Each tank is divided in compartments, at the bottom of which check valves are fitted; those valves are working so that the loss of gasoline is always limited, in the event of one of the compartments being shelled, to the contents of the damaged compartment above the shell hole. The gasoline goes by gravity to the two wind-driven centrifugal pumps, which are fastened to the U struts of the chassis. From there it goes to a central distributor disposed between the seats of the pilots and easily accessible to them. This distributor has seven cocks, three controlling the pipes running to the carburetors of the three engines, two for the pipes coming from the two pumps, one for the pipe going to the two small auxiliary tanks, and one to evacuate eventual air bubbles from the system. The two nurse-tanks are attached to the front nacelle interplane struts, underneath the upper wing. Their principal function is to feed the engines, through the distributor, when the machine is on the ground. As soon as the wind-driven pumps begin to work, the small gravity tanks are filled again through their connection with the distributor. The over-flow sends the overflow gasoline back to the big fuselage tanks.

One alone of the two gasoline pumps is sufficient to feed the entire system.

Lighting and Heating

The lighting and heating system is fed by a wind-driven generator of 600 watts, combined with a storage battery.

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SEP 5 1919

AERIAL AGE WEEKLY

Vol. 9, No. 24 25 SEPTEMBER 1, 1919 10 CENTS A COPY



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An aerial view of the oil field at Rangeburnett, Oklahoma

The New York—Toronto—New York Race

PUBLISHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY
Entered as second-class matter March 25, 1915, at the Post Office at New York, under the act of March 3rd, 1879

Less Weight—More Mail

The use of the airplane in commerce has given a new value to savings of pounds and ounces in its construction—a value that is calculated in terms of dollars and cents profit.

Thus the big weight-economies effected in the Liberty engine by the use of 59 Lynite parts play an important part in the notable success of the U. S. postal air service.

Through its saving of from 350 to 400 pounds, Lynite permits more mail to be transported on each trip, makes possible greater speed and has other advantages.

Moreover, the greater heat conductivity of Lynite is an important factor, especially in the pistons, enabling the engine to perform better and travel farther without requiring overhauling.

Eighty-five per cent of all the aluminum alloy castings in the Liberty engine were made of Lynite or to Lynite formulae.

Cleveland-Chicago postal plane leaving Woodland Hills field, Cleveland



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VOL. IX NEW YORK, SEPTEMBER 1, 1919 NO. 25

"DO YOU KNOW ANYBODY WHO IS BUYING A PIANO?"—GLENN H. CURTISS

ONE of these chronic pessimists who have been standing in the way of aeronautic progress was arguing with Mr. Glenn H. Curtiss that he could not see much of a future for civilian aviation.

"I don't know anybody who is buying a 'plane," he said, with a tone of finality, and apparently fully convinced that his argument was unanswerable.

"Do you know anybody who is buying a piano?" inquired Mr. Curtiss.

Of course he did not, nor do you, gentle reader. You do not ever know anybody who is buying a Ford or a hat or a pair of shoes. Yet the piano factories are as busy as ever—and the last report had it that Henry Ford had paid the best part of *one hundred million dollars* for the *minority stock* of the Ford company.

Nevertheless, over five hundred aeroplanes have been sold and delivered to individual owners since March, 1919, and the reason not over that number have been delivered is that the manufacturers were liquidating their government contracts and could not produce faster.

The demand is as great for $7,500 pleasure 'planes as it is for $2,500 'planes.

A great many buyers acquired Curtiss training 'planes because they could not get the "Oriole" type of pleasure 'plane—or any other type.

The first "Oriole" was built for the Second Pan-American Aeronautic Exposition, which was held at Atlantic City in May, 1919. It will be recalled Roland Rohlfs flew it to Atlantic City on May 1st in a storm, carrying the Hon. Victor Hugo Barranco, special representative of the President of Cuba, as passenger. By June the demand for this type of machine caused the Curtiss company to put it in production. It was decided to build ten, then twenty, then thirty-five, then one hundred and thirty-five. We will not give away a trade secret by stating the present number of "Orioles" and flying boats sold to-day, but we may state that over one hundred people are waiting patiently—and some impatiently—for deliveries.

Here is another case. A well-known veteran aviator secured the agency for second-hand military training aeroplanes and inserted five advertisements in AERIAL AGE. He got over four hundred orders and inquiries—but has been unable to get 'planes fast enough to fill the orders. Another AERIAL AGE advertiser had only one 'plane to sell and wanted $7,500 for it. He sold it—and had a score of prospective customers to spare.

AERIAL MAIL PLAN SAVES $170,000 YEARLY

"THE aerial mail service between New York and Washington and New York and Chicago has already saved the country $170,000 a year over the railway mail, and when the multi-motored aeroplanes are in operation there will be an annual saving of $1,500,000."

Assistant Postmaster General Otto Praeger made that statement before the Cleveland Chamber of Commerce, which held an aviation week in celebration of the one hundred days' perfect mail service between Cleveland and Chicago.

"During the one hundred days," said Mr. Praeger, "the Cleveland--Chicago division has been in operation the mail ships have flown a total of 65,000 miles and carried more than 3,000,000 letters. It has brought the East and Middle West closer together by sixteen hours, and the Atlantic and Pacific coasts by twenty-four hours.

"We have given you a demonstration of what the aerial mail can do, and it rests with the people now to tell Congress what to do."

Alva Bradley, chairman of the aviation committee of the Cleveland Chamber of Commerce and vice-president of that body, read the following resolutions adopted by the directors of the chamber:

"*Whereas,* For the past one hundred consecutive days the aerial mail service between Cleveland and Chicago has been operated successfully, thereby demonstrating the practicability of mail transportation by this means; and

"*Whereas,* The aeroplane terminal facilities in both Cleveland and Chicago are inadequate to accommodate even the present limited traffic; and

"*Whereas,* Owing to the increase of aerial transportation, an urgent need for Federal regulation of aircraft traffic is apparent; now, therefore, be it

"RESOLVED, That the Cleveland Chamber of Commerce urges upon Congress the desirability of enacting suitable legislation regulating aircraft traffic, and that the Chamber of Commerce further petitions the Post Office Department, in co-operation wherever practicable with the military and naval aviation services, to extend the aerial mail service as rapidly as possible throughout the United States, and especially to provide suitable terminal facilities in those cities where such mail service is now in operation."

Mr. Praeger said he expected the aerial mail to be in operation to Minneapolis, Omaha and St. Louis by early spring, when multi-motored ships, carrying as much as 3,000 pounds of mail, would be available.

Colonel Dunwoody declared that the European nations, and Great Britain especially, were encouraging aviation, and warned that unless the aviation industry of this country were given the benefit of a fixed American policy it would rapidly die out, with the result that when America again wanted an air service it would find it had none.

As a result of the joint activities of the Cleveland Aviation Club and the Cleveland Chamber of Commerce twenty-two Ohio cities, including Cincinnati, have set about establishing landing fields within the week.

THE NEW YORK-TORONTO-NEW YORK RACE

THIRTY-SIX military and three civilian aviators participated in the New York-Toronto-New York race for which John McE. Bowman offered $10,000 in cash prizes and the American Flying Club and the Canadian National Exposition offered a trophy.

The Prince of Wales did not start the race from Toronto, as had been announced. He was not present for the start. The start from Toronto was made at Leaside, a suburb of the city, though most of the judges were at the exhibition grounds.

Twenty-eight planes made the start from New York and eleven from Toronto.

The first plane to arrive from Toronto was the De Haviland 9A, piloted by Sergeant C. B. Coombs, who covered the distance in 6 hours and 21 minutes, reaching Roosevelt Field at 7:11 P.M. Roland Rohlfs arrived seven minutes later, and he was followed by Major R. M. Schroeder, who landed four minutes after him.

The first plane left Roosevelt Field for Toronto at 1:57 P.M. The start had been delayed for five hours by rain. Three planes from New York were wrecked on landing at the Albany field, and many others had to abandon their journey at various points along the route owing to engine and other troubles.

Of the total thirty-nine machines, thirty-two reached Albany. Six of these had made the start in Canada and twenty-six in Mineola.

Three of the fliers who entered in the air race have completed the round trip as we go to press. All are Americans.

Lieutenant M. B. Plumb, flying a De Haviland 4, alighted at Roosevelt Field, Mineola, at 5:50:30 o'clock in the afternoon. He had started in the morning from Syracuse, where darkness overtook him Monday evening, and had flown to Toronto, starting from the Canadian city on his return trip about noon.

Better time, apparently, was made by two fliers who finished at Toronto, whence they had started Monday, Major Rudolph Schroeder, who flew a VE-7, arrived at Leaside Park, just outside the city, at 5:20 o'clock. His actual flying time, according to his log, for the 1,000-mile trip was 9 hours and 25 minutes.

Colonel Gerald Brandt, another American, who also had started from the Canadian point of departure, arrived a few minutes after Major Schroeder.

Eight new entants started from Mineola Tuesday morning. Major Schroeder, Sergeant A. B. Coombs and Roland Rohlfs, who arrived at Roosevelt Field Monday evening, started northward early in the day, and five others who had started from the Canadian end of the race, arrived at Mineola and departed on the return trip before the close of the afternoon.

Several accidents occurred. Lieutenant Austin Crehore, of New York, one of the new contestants, was seriously injured in making a landing at Albany while on his northward trip. His arm was broken and he received possible internal injuries. Others put out of the race by mishaps included Captain Steinle, whose SE-5 was smashed while making a landing at the control station at Buffalo, and Major Elliot Spring, whose plane developed engine trouble and forced him to descend near Batavia, N. Y.

Following is a list of the contestants and the types of machines used:

Lieut. P. H. Logan (Le Pere), Capt. J. C. Foote (L. W. F), Major Elliot Springs (L. W. F.), Capt. O. E. Simonian (De Haviland 4), Lieut. Chas. Colt (SE-5), Capt. J. O. Donaldson (SE-5), Lieut. Wm. C. F. Brown (De Haviland 4), Major Lewis Hasslitt (De Haviland 4), Lieut. R. F. Midkiff (De Haviland 4), Major J. W. Simons (De Haviland 4), Capt. Steinle (SE-5), Capt. R. S. Brown (SE-5), Lieut. Ben Adams (De Haviland), Capt. F. E. Kindley (S-5), Lieut. M. J. Plumb (De Haviland 4), Major Gilkinson (Curtiss), Capt. H. B. Chandler (JN-4 H), Lieut. N. R. Taylor (De Haviland 4), Lieut. L. W. Bertand (Curtiss training), Capt. Richard Depew (JN-4 D), Major J. L. Lyons (JN-4 D), Lieut. B. N. Maynard (De Haviland 4), Lawrence Sperry (Avro), Colonel U. G. Jones (JN-4 H), Lieut. Melville (Caproni), Capt. Reynolds (De Haviland 4), Lieut. William Coates (De Haviland 4), Colonel G. C. Brant (De Haviland 4), Lieut. Ross Kirkpatrick (De Haviland 4), Lieut. H. H. George (De Haviland 4), Capt. A. B. Crehore (SVA), Lieut. R. Rolfe (Curtiss), Roland Rholfs (Curtiss), Sergeant A. B. Coombs (De Haviland 4), Lieut. C. A. Schiller (JN-4), Capt. H. W. Cook (Fokker), Capt. S. S. Moore (JN-4), O. S. Palmer (Curtiss), Bert Acosta (Curtiss), Colonel William B. Barker (Fokker).

On Tuesday evening the leaders in the race on Monday were well behind. Sergeant Coombs left Albany before noon, and though reports had not been received from him it is estimated that he must have got to Syracuse. Rohlfs, Barker, Schiller and Acosta were an hour or more behind him, with no definite reports after they had left Albany.

Those who should finish at Mineola during Wednesday are Col. Hartney, Lieut. Colt, Capt. Simonin, Lieut. W. C. Brown, Major Simons and Lieut. Midkiff, the last two squadron mates of Plumb.

So far the only civilian flier to make a showing is Roland Rohlfs.

Plumb was enthusiastically greeted at Roosevelt Field. Officers and enlisted men had been straining their eyes for an hour, knowing that he was on the way from Albany. As soon as his plane was heard a hundred strong glasses were turned upon it. The moment the number was read a cheer went up that could have been heard in Hoboken. Men from all parts of the camp rushed to the field to welcome him.

And when he had climbed out, shaken hands with Col. Archie Miller and other officers, he climbed back in again, posed a moment for the photographers and movie men, and rose in the air. Once up he put his plane through some of the most thrilling stunts that even Roosevelt Field has ever seen, as if to show that even a thousand-mile race couldn't bother her. Then he hopped over to his home station at Hazelhurst Field and went to bed.

Plumb's flight yesterday was nervy from end to end. Between Buffalo and Syracuse he was compelled to land to replenish the water in a leaky radiator. He made the landing in a cornfield, horror of all aviators, made it successfully, filled his tank, tied up the leaky place with a bit of towel and got away again in perfect form.

Fire was his other peril. Shortly after leaving Buffalo a piece broke out of his exhaust pipe and flames swept up into his face in the cockpit. He was obliged to drive the rest of the way with reduced gas pressure in order to save his face from the flames.

He attributed his good luck to two mascots—a five-dollar gold piece tied up in a greasy handkerchief and a bit of goldenrod. He refused with a grin to describe the origin of either.

"They worked, didn't they?" was his only comment.

So far as getting first home is concerned the race has been all to the De Haviland bombing planes of the Army Air Service, equipped with 400 horsepower Liberty motors. This by no means establishes supremacy under the peculiar conditions laid down for the present contest. For the first time the American Flying Club has worked out a handicap formula for aeroplanes. Under it victory depends upon the degree with which each machine exceeds or falls below the speed which its horsepower and carrying power should give it.

Flying luck, of course, enters into these calculations and the machines that meet the greatest amount of head winds will suffer for it. Likewise those that ride favoring gales will gain. But, as any entrant could choose his starting point, it all goes to prove the airmanship which will gain the $10,000 of prizes hung up by the Hotel Commodore for the civilians and the commendations for the soldiers who are barred from the money prizes.



The News of the Week



Glidden Plans Two Year Aerial Tour of the World

Atlantic City, N. J.—Captain Charles J. Glidden, donor of the Glidden trophies for automobile and aerial touring, is contemplating a two-year aerial trip around the world. Captain Glidden stated that he intended to cover in one or two years all the points reached in his automobile tour of the world, which required eight years. On the automobile tour the extreme points were the Arctic Circle in Sweden and the most southerly road in the world in New Zealand.

Captain Glidden has driven motor cars in thirty-nine countries, twice around the world, covering a distance of 100,000 miles.

Army Plane Fires on Bandits

Fort Sam Houston, Tex.—An army observation 'plane fired on a group of Mexican bandits on August 19, believed to be the band which captured Lieutenant Peterson and Lieutenant Davis. The following is the official report from Colonel Langhorn:

"Observation 'plane returning here today (August 19) reported having seen three bandits about ten miles west of Candelaria. Bandits fired on 'plane. Fire returned, and aviators believe one horse and one bandit killed, and another bandit took to a nearby canyon, his riderless horse escaping. Both wings of 'plane show bullet holes. LANGHORN."

Three New Landing Fields in Pennsylvania

Harrisburg, Reading and Scranton have each laid plans for the establishment of aerial landing fields. At Harrisburg a committee of business men have been working with the City Council to establish their landing place at the western end of the city. A committee of the Reading Chamber of Commerce, which is consulting with city and county officials, is working out plans for the construction of an aerodrome at a site near the local almshouse. The field is large enough to accommodate one hundred 'planes.

The landing field at Scranton has been officially dedicated by Mayor Alexander Connell. It is pronounced one of the best municipal fields in the locality.



Mr. Claud Johnson, the Managing Director of Rolls-Royce Ltd. who is now in the United States in the interests of his company

Aerial Explorers Over Labrador

Curling, N. F.—Captain Daniel Owen, R. A. F., with a party of aviators who have been making exploration flights over Labrador, returned here on August 22 after a month near Battle Harbor. The expedition was successful in locating timber lands from which millions of cords of pulp wood can be cut and rolled to streams for direct shipment.

The expedition, which included in its equipment three aeroplanes and comprised a personnel of twenty persons, among them five aviators, operated seventy miles north of Battle Harbor. Two million acres of timber land was explored by air and by the ordinary methods of timber cruising. Pictures taken from the air, numbering 13,000, were said to show dense growths of pulp material. This use of the aeroplane was looked upon as opening a new field for commercial aviation.

The planes cruised inland for more than 100 miles, flying at heights of 2,000 to 9,000 feet.

Salesman Gets Large Orders on Speedy Flying Boat Trip

New York, N. Y.—Roland Bassett, chief salesman for Sweet, Orr & Co., overall manufacturers, is the first salesman to employ a flying boat on a selling trip. He flew on August 20 from New York to Poughkeepsie and return, making numerous stops en route. Starting at 1:35 P.M. from West Eighty-third Street, the first stop was made at Yonkers., arriving there at 1:50 P.M., and being tendered a reception by the leading merchants of the town, Mayor Johnson and about 1,000 spectators. The honor of handing the first order to an aerial salesman there fell to George W. Horton, a Yonkers clothing dealer, who handed Bassett a $400 order and suitable congratulations. Leaving there at 2:10 P.M., the next stop, Peekskill, was made in 25 minutes. The first Peekekill order was given by Decatur, Posey & Yellott, dry goods dealers. Newburgh was reached at 3:15. P.M., five minutes ahead of the scheduled time, and there also an informal reception was staged for Bassett. The first order was given by Sig and Max Samuels. Poughkeepsie was reached at 3:56 P.M., by which time the flying boat was ten minutes ahead of the schedule. At this point Bassett and Pilot Zimmermann stepped ashore and after partaking of light refreshment and totalling their orders they purchased newspapers, taking off for New York City at 4:30 P.M. Immediately following there arrival off 33rd Street at 5:35 P.M., the successful air salesman and his pilot were tendered a complimentary dinner by the officers of Sweet, Orr & Company.

Mr. Bassett stated that the flying boat is the ideal means of travel and predicted that it would soon come into general use for traveling men. Lack of suitable landing places was the chief difficulty encountered.

As a result of the success achieved by their pioneer aero salesman, Sweet, Orr & Co. announced that they will place orders for three similar type Aeromarine flying boats.

Aeroplane Hunts Moonshiners

Montgomery, Ala.—Use of aeroplanes in locating illicit distilleries in the Alabama mountains was inaugurated, Deputy Marshal J. A. Wall making a trip over the surrounding territory. He announced later he expected several arrests to follow.



The first test of the Lawson 26 passenger carrier, powered by two Liberty motors took place recently at Lawson Field

Lands and Takes Off from Warehouse Roof

Newark, N. J.—Edwin E. Ballough, of Newark, who was formerly in the Army Air Service, landed an aeroplane on top of a building on August 22 at the Quartermaster's Depot in Newark, and then took off from the roof successfully. This is the first time in the history of aviation that such a feat has been accomplished, although a French aviator once succeeded in landing on a building in Paris. The Frenchman, however, was unable to "take off" from the roof as Ballough did.

Ballough had as a passenger in his machine Chris M. Wagner, a Newark newspaper photographer, and after taking pictures of the depot and the shipyards of the Submarine Boat Corporation, the aviator did stunts for the amusement of the crowd below. He came down to a very low level, and swooped in and out among the boats, several times getting close enough to touch them. Ballough said afterward that the idea of landing on the roof of one of the depot warehouses came to him suddenly and he determined to try it.

He picked out a warehouse 987 feet long and 80 feet wide, with a peaked roof, inclining slightly downward on either side of the peak. The machine spiralled down to a low level and straightened out just above the roof. It then landed successfully, straddling the peak, the greatest danger being the possibility that the machine would go over the edge of the roof sidewise. Ballough stopped the plane about ninety feet from the end of the warehouse, and after resting there some minutes started his motor and "took off" without a great deal of trouble, although after leaving the roof the plane came down so low that it almost grazed the water of the ship canal.

Lieutenant Arthur Brown, Trans-Atlantic Flier, Arrives Here September 20th

New York, N. Y.—Information has been received here that Lieutenant Arthur Whitten Brown, the navigator of the Vickers-Vimy transatlantic aeroplane, will arrive in the United States on September 20. He will make an extensive lecture tour through the United States under the direction of the James B. Pond Lyceum Bureau.

First Lawson Air Liner Completed

Milwaukee, Wis.—The Lawson Air Line Transportation Company of this city has completed the first of its type C-1 passenger carrying aeroplanes, described in detail in the July 7 issue of AERIAL AGE WEEKLY.

The machine is of biplane type, powered by two Liberty engines. The wing spread is 95 feet, length of the body 50 feet, and speed of 90 to 100 miles an hour. According to Alfred W. Lawson, the designer and constructor, one engine has sufficient power to continue flight for 200 miles in case the other engine breaks down.

With a full load of passengers and a large cargo of mail or other material, this machine will climb 4,000 feet in ten minutes. It has a ceiling of 15,000 feet. The gliding angle of this 'plane is so great that it will glide from thirty to forty miles with the engines cut off at 15,000 feet, and the glide angle is so flat that it will not affect the confidence of the passengers, especially those who have never been up before.

Seats are placed at the windows on each side of the cabin, which allows plenty of vision for the passengers, together with a feeling of great security.

It is operated by a captain and two lieutenants, who act as pilots. An engineman and a mechanic are also carried along on the trip as crew in case of need.

Alfred W. Lawson will act as captain of this first ship until one of the two lieutenants has been instructed and is capable of handling the ship in accordance with the new commercial code of flying safely as expected by Mr. Lawson. As soon as pilots prove their capability of safe and sane flying, and new ships are ready for service, the pilots will be promoted to become captains, and will then be given command of ships.

It is the intention of the Lawson Company to build a number of this type of ship within the next few months, to be used in regular daily service between New York and San Francisco, stopping at the leading cities en route.

The new Lawson air liner has already been taken to the Milwaukee County aviation field and is being put thru its initial tests.

Within the next few days it will be started out on a pathfinding tour between Milwaukee, Chicago, New York and San Francisco, and those cities which offer the most suitable landing stations will be selected as the first stations upon the trunk line between the Atlantic and Pacific Oceans.



A few Curtiss Orioles being put through final tests at the Curtiss Field at Buffalo

Ohio Ready to Receive Aerial Tourists

Cleveland, Ohio.—The Cleveland Aviation Club, in response to telegraphic requests to Ohio cities regarding landing facilities for aerial tourists received replies from many cities declaring themselves to be prepared for aerial tourists. These cities include Cincinnati, Youngstown, Urbana, Zanesville, Portsmouth, Mansfield, Findlay, Cambridge, Sandusky and Hamilton.

Although unfavorable weather conditions existed on the opening day of Cleveland Aviation Week, 12,000 people watched a squadron of seven Army planes go through evolutions and stunts over Cleveland Aviation Field. More aeroplanes and a number of balloons will join the squadron before the end of the celebration.

The Cleveland Aviation Club has a membership of which nearly two hundred are Air Service aviators and it is devoting its efforts to making Cleveland a great flying center. This city is on the New York-Chicago and the transcontinental air line.

Air Service Recruiting Discontinued

Washington, D. C.—According to an official statement issued by the War Department News Bureau on August 20, instructions are being issued discontinuing at once enlistments for the heavier-than-air and for the lighter-than-air branches of the air service.

Italian Dirigible to Be Demonstrated in Washington

Washington, D. C.—Lieutenant Signor Angelo Faroli Piazza, R. I. N., will demonstrate the Italian O-9 dirigible to naval officials in the near future. Lieutenant Piazza has received many decorations for his heroism in the war.

Joint Army and Navy Planning Board and Committee Formed

Washington, D. C.—War Department General Order No. 94 provides for the formation and personnel of a Joint Army and Navy Board and a Joint Army and Navy Planning Board. It will have the following membership: (1) For the Army: The Chief of Staff; the Director, Operations Division, General Staff; the Director, War Plans Division, General Staff. (2) For the Navy: The Chief of Naval Operations; the Assistant Chief of Naval Operations; the Director of Plans Division, Naval Operations.

The function of the Board is to secure co-ordination of effort of the two services.

Wadsworth Urges Purchase of Army Air Fields

Washington, D. C.—The purchase of March, Mather, Ream and Ross fields in California; of Ellington, Kelly No. 2, and Brooks Field, Texas; Park Field, Tennessee; Selfridge Field, Michigan; Chanute Field, Illinois; Chapman Field, Florida, and the repair depot at Montgomery, Alabama, is proposed in a bill introduced by Chairman Wadsworth of the Military Committee.

The AIRCRAFT TRADE REVIEW

Duesenberg in New Willys Corporation

New York, N. Y.—Officials of the Duesenberg Motors Corporation announced that it is a subsidiary of the recently formed Willys Corporation, organized to manage the holdings of John N. Willys. The Duesenberg Corporation was formerly a subsidiary of the American Can Company. The new six-cylinder Willys-Overland car is to be constructed at the Duesenberg plant.

Alaska Aircraft Corporation Plans Huge Freight Planes

Seattle, Wash.—The Alaska Aircraft Transportation Co. has been incorporated under the laws of the State of Washington for the purpose of building and operating aeroplanes for carrying passengers and freight. The officers of the company have an intimate knowledge of topographical and climatic conditions in Alaska, as well as of the aircraft and transportation industries.

Flying fields, hangars and shops will be located at Valdez. It is planned to establish landing fields in the interior to replace the present hazardous and uncertain transportation conditions. A machine to carry six tons of freight, having four motors and 3,360 square feet of supporting surface is to be used.

The officers of the company are: Tod M. Date, president and general manager; Milton Van Dyke, first vice-president; H. E. Ellis, second vice-president; James P. Holman, secretary and treasurer. Mr. Tod M. Date, the president of the company, has had twelve years of experience with transportation problems in the North, and was connected with the Standard Aircraft Corporation during the war and the Naval Aircraft Factory at Philadelphia. Associated with him are a group of experts who have been connected with various aircraft companies as designers and constructors.

California-Catalina Service on Six Trips a Day Schedule

San Pedro, Cal.—Syd Chaplin, motion picture star, who has taken up aviation, has inaugurated the first passenger air line in America, which is believed to be the first ever put into daily operation.

Operating between San Pedro, California, and Santa Catalina Island, the Syd-Chaplin Aircraft Corporation is now running a fleet of Curtiss Seagull flying boats on a six-times-a-day schedule, carrying passengers, mail and express. The distance covered is about forty miles and the fare is $27 for one way and for the round trip $43.20. The schedule has been in operation since the middle of July.

The week-end schedule, Friday, Saturday and Sunday, is as follows:

Leave San Pedro.	Leave Avalon..
5:30 A.M.	7:30 A.M.
9:30 A.M.	10:30 A.M.
11:30 A.M.	12:30 P.M.
1:30 P.M.	2:30 P.M.
3:30 P.M.	4:30 P.M.
6:00 P.M.	7:00 P.M.

The midweek schedule, Monday, Tuesday, Wednesday and Thursday, is as follows:

Leave San Pedro.	Leave Avalon.
5:30 A.M.	7:30 A.M.
10:30 A.M.	2:30 P.M.
3:30 P.M.	4:30 P.M.
6:00 P.M.	7:00 P.M.

Mr. Chaplain is the representative for the territory of Southern California and Arizona, and, in addition to passenger-carrying service, he is opening up schools and distributing Curtiss machines, including flying boats and land machines.

Curtiss Ships Planes to Rio and Buenos Ayres

New York, N. Y.—The first foreign shipment of aeroplanes since the war was made recently, when six land machines of JN type and two Curtiss Seagulls were shipped to Rio de Janeiro. C. W. Webster, in charge of South American sales, sailed on August 23.

Passenger Boards Steamer from Seaplane

Seattle, Wash.—Jasper C. Mayer, a Red Cross official, was forced to miss the steamer Kashimura Maru on July 12, bound for Siberia, on account of delay in obtaining his passports. The ship left at 10:45. At 11:50 Mr. Mayer embarked aboard of Boeing seaplane piloted by Eddie Hubbard. The seaplane taxied alongside the ship and Mayer signalled his associates aboard the steamer. Arrangements were then made to board the steamer by means of the pilot launch.

Although the flight cost $75, Mr. Mayer is well satisfied, having avoided more than two weeks' delay.

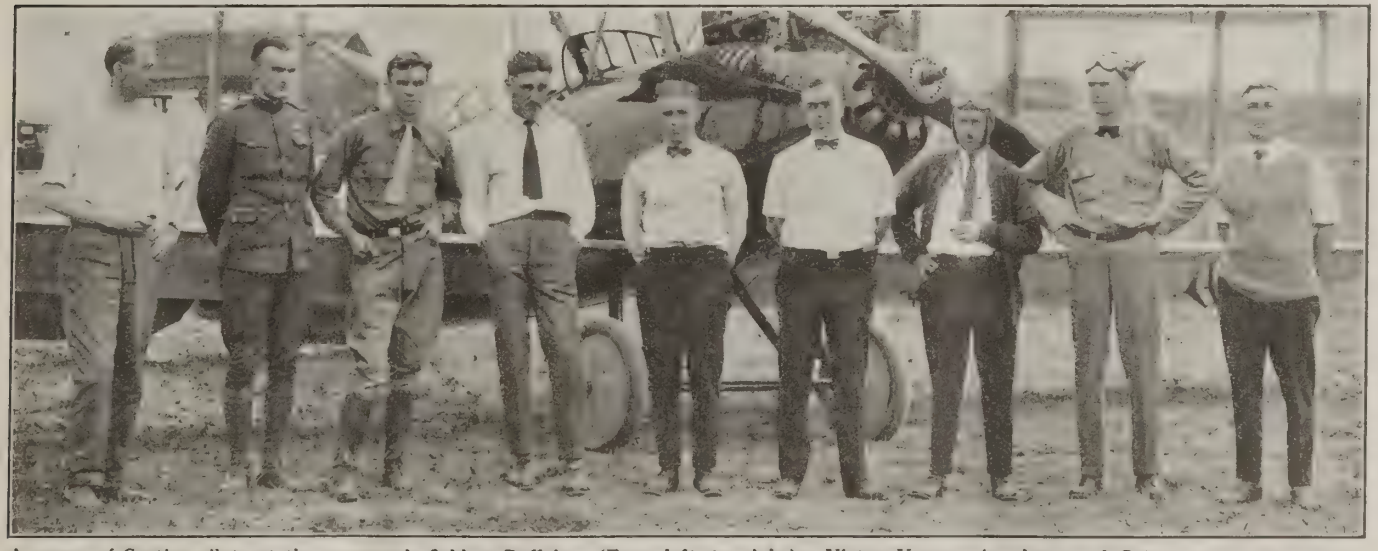
Houghton Now With White Company

The George D. White Company, of Los Angeles, has secured the services of Howard D. Houghton, who will take entire charge of their propeller department, according to an announcement made recently.

Mr. Houghton has formerly been with the Glenn L. Martin Company, the Wright-Martin Aircraft Corporation and other leading concerns as well as Government inspector before coming to the White Company. He lately has been with the Loughead Aircraft Company where he designed and constructed the propellers used on the Liberty motored bombing seaplanes built by that firm for the United States Navy. Mr. Houghton's first duties with the White Company will be the construction of the propellers for the giant triple motored monoplane now being built for the trans-Pacific flight.

Wisconsin Aeroplane Firm Building Hangars

Eau Claire, Wisc.—The Eau Claire Aero Corporation has been incorporated wtih a capital stock of $25,000 by local business men. A hangar is being constructed on a new flying field established at the old fair ground south of Eau Claire. Ensign Virgil R. Grace, late of the United States Navy, is vice-president and general manager; Guy R. Wood is president, and A. J. Walsh secretary-treasurer.



A group of Curtiss pilots at the company's field at Buffalo. (From left to right): Victor Vernon, in charge of flying operations; Roland Rohlfs, holder of the world's altitude record; Bert Acosta, pilot; O. S. Parmer, pilot, in charge of aeronautical instruction at Junior Plattsburg Camp; J. P. Davies, sales manager, Curtiss Aeroplane and Motor Corporation; Walter E. Lees, pilot; J. D. Hill, pilot; G. A. Worsham, pilot

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative



PILOTS

Dana C. DeHart
Edward V. Gardner
Eber H. Lee
John M. Miller
Leon D. Smith
Max Miller
Charles E. Bradley
Lester F. Bishop
Harold T. Lewis
Leslie E. Stancill
Charles Hugh Anglin
John H. Skoning
Earl F. White
Charles W. Lamborn
Frank H. Crozier
Walter H. Stevens

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

Postmaster Sinnott Makes Flight

Postmaster James F. Sinnott, of Newark, N. J., made a flight in a Wittemann-Lewis Model C plane last week, piloted by Lieut. S. A. Morgan, former Army instructor, flying from Newark to Asbury in 29 minutes.

The trip was arranged by L. S. Plaut & Co., of Newark, who makes regular deliveries of their dry goods merchandise by aeroplane. Julius S. Meirick is director of flying at the Plaut plant.

Britain Investigates U. S. Aerial Mail Service

Cleveland.—That the American aerial mail service is attracting international attention is indicated by the receipt of a letter from Winston Spencer Churchill, British air minister, to John A. Jordan, superintendent of the Cleveland-Chicago division, in which the minister seeks all possible data on the system. The letter has been forwarded to Washington.

The letter includes data on British air systems and points out that Great Britain is seeking every possible method to improve and develop aerial travel.

Mail Planes Test Alcohol Fuel

Washington, D. C.—One hundred and thirty gallons of alcohol were brought into Washington by an air mail plane of the Post Office Department recently. The plane flew 3,000 feet over the heads of the excise officers and policemen on the lookout for bootleggers. The alcohol was not carried in the mail bags, which would be in violation of the law, but in the fuel tanks, nor was it peddled around in the haunts of the bootleggers after its arrival. The proper thirst for this character of alcohol has not yet been cultivated. It contains a fair percentage of benzol and enough ether to give it additional kick.

The plane which brings in this alcohol every other day is known among the air mail pilots as the "Bootlegger," and is the forerunner of a revolutionary change in the motor operation of the Air Mail Service. This product is the new alcohol fuel which takes the place of the high-grade aeroplane gasoline. After a number of tests with this new fuel under adverse weather conditions, the Post Office Department is changing over its aeroplane engine attachment and will shortly be operating the entire New York-Washington route with the alcohol fuel.

Its great advantage lies in the cleanliness of the motor, reducing cost of upkeep, and in its burning cooler than gasoline, thereby overcoming objections to the high compression motor at low altitudes. The planes which ordinarily use 25 to 26 gallons of gasoline operate on the new fuel on about 20 gallons, which gives greater flying radius to the planes. It reduces chances of forced landings by keeping the spark plugs and the engine cylinders clean of carbon and oil accumulations. With this fuel it will be possible to operate the mail in a De Haviland 4 regularly in a non-stop flight from New York to Cleveland, a distance of 430 miles, whenever fog or rain conditions in the mountains make it inadvisable to attempt to land at the intermediate field at Bellefonte, Pa.

Oriole Flies from Denver to Estes Park

Denver, Col.—Seventy-nine years after the first white man, Kit Carson, entered Estes Park, Colorado, and sixteen years after the first auto made its appearance at the same spot, a Curtiss Oriole three-passenger land machine recently made a successful flight from Denver to the famous Colorado resort. Against a heavy wind blowing off the Continental Divide, the 'plane, carrying a special aeroplane edition of the Denver *Post*, made the trip in fifty-five minutes. In addition to several hundred copies of the paper, the machine carried I. B. Humphreys, president of the Curtiss-Humphreys Airplane Company, and Pilot A. M. Lendrum, and reached an altitude of 11,940 feet.

Personal Pars

Lieutenant Leon B. Wilcox, chief engineer officer at Chanute Field, has received his discharge and has been made chief motor instructor at the Academy of Applied Aeronautics, Chicago, Ill.

UNITED STATES POST OFFICE

AIR MAIL SERVICE—WESTERN DIVISION

JUNE, 1919

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone and Water	Miscellaneous	Pilots	Mechanics and Helper	Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND UNIT COST					
													Gallons of Gasoline	Total Time Run	Total Miles Run	Miles Run per Gallon of Gasoline	Cost per Hour	Cost per Mile
														hr. min.				
61	$30.69	$4.93	$42.69	$25.92	$20.73	$46.45	.....	$27.60	$1.57	$50.00	$51.00	$301.58	93	.....	.....	.....	.....	.....
62	260.70	38.43	57.69	25.92	20.73	69.37	231.54	141.14	103.86	50.00	51.00	1,050 38	790	29 08	2925	3.7	$36 00	$.36
63	106.32	15.90	82.29	25.92	20.73	99.32	78.22	87.76	25.39	50.00	51.00	642 85	237	9 50	500	2.1	65.40	1.29
64	109.77	20.82	76.17	25.92	20.73	224.26	89.60	102.33	111.75	50.00	51.00	882 35	336	11 16	1495	4.4	78.60	.59
65	294.69	45.81	57.69	25.92	20.73	60.14	252.85	141.70	2 07	50.00	51.00	1,002.60	865	31 49	2925	3.3	31.80	.34
66	109.23	13.48	57.69	25.92	20.73	75.86	80.19	123.66	110.26	50.00	50.99	718.01	351	10 05	695	1.9	71.40	1.03
67	132.99	25.83	82.29	25.92	20.73	101.27	82.71	122.69	1.57	50.00	50.99	696.99	403	10 24	1424	3.5	67.20	.49
69	.....	.....	47.19	25.92	20.73	71.27	.....	38.14	.....	50.00	50.99	304 24	.....	.....	.....	.....	.....	.....
70	144.90	20.84	57.69	25.92	20.73	62.21	164.40	156.01	4.00	50.00	50.99	757.69	430	20 41	1950	4.5	36.60	.39
72	322.13	41.46	76.17	25.92	20.73	117.05	242.25	151.09	53.89	50.00	50.99	1,151.68	984	30 29	3555	3.6	37.80	.32
73	29.10	4.95	47.19	25.92	20.73	71.26	.....	266.47	413.54	50.00	50.99	980.15	88	.....	.....	.....	.....	.....
74	296.50	46.22	57.69	25.93	20.73	62.98	273.50	140.15	1.24	50.00	50.99	1,025.93	900	34 25	3250	3.6	30.00	.32
75	17.15	1.37	42.69	25.93	20.74	47.62	.....	61.00	.....	50.00	50.99	317.49	55	.....	.....	.....	.....	.....
76	315.81	43.08	57.69	25.93	20.74	238.96	218.29	169.60	99.24	50.00	50.99	1,290.33	961	27 28	2725	2.8	46.80	.47
3212	26.73	1.14	22.58	25.93	23.74	33.76	.....	38.27	.....	50.00	50.99	270.14	81	.....	.....	.....	.....	.....
14872	60.56	8.02	79.16	25.93	20.74	70.79	74.23	121.86	39.40	72.50	50.99	624.18	194	9 20	245	1.3	66.60	2.55
39366	.....	.....	42.68	25.93	23.74	47.62	.....	27.82	.....	72.50	50.99	288.28	.....	.....	.....	.....	.....	.....
Total..	$2,257.27	$332.28	$987.24	$440.70	$352.46	$1,500.19	$1,787.78	$1,917.29	$967.78	$895.00	$866.88	$12,304.87	9768	224 55	21689	2.22	$50.40	.57

Cost per mile, overhead, $.17; cost per mile, flying, $.20; cost per mile, maintenance, $.20.

OTTO PRAEGER, Second Assistant Postmaster General.

"NEW PLANES FOR OLD"

THE WORK OF THE AVIATION REPAIR DEPOTS

By WILLIAM MENKEL

Former Captain in the U. S. Air Service and Commanding Officer of the Aviation Repair Depot at the Speedway, Indianapolis, Ind.

The Aviation Repair Depot at Indianapolis has been so thoroughly co-ordinated and systematized that AERIAL AGE *has found it desirable to describe the entire system of the depot, and has been fortunate in securing the co-operation of Capt. Menkel in this work, under whose command much of the good work at Indianapolis was accomplished. In the forthcoming days of commercial aerial transportation, when every large efficient aircraft corporation will require an efficient repair depot, the present article may well be taken as a substantial "standard practice" when outlining such a factory.*—EDITOR.

THAT the Air Service program mapped out for war purposes was elaborate and expensive is well known, and much has been written in the public press and aired in Congressional speeches regarding the immense outlay of American treasure, all having for its final and dramatic object the defeat of the Boche by air. Yet few people realize the manifold ramifications of our aeronautic activities—the various ground schools, training fields, repair and supply depots, radio, photographic, gunnery and balloon schools, mobilization camps, testing field and acceptance park, and a multitude of other institutions that sprang up almost like mushrooms in the night, dotting the country from coast to coast and from North to South. A map of all the air service stations in this country alone, to say nothing of American stations located in Canada, England, France and Egypt, would be an "eye-opener" to the average individual who was curious to learn the ultimate destination of the hundreds of millions appropriated for American aviation.

There was little opportunity for the public to know of many of these war plants of the air service, except for the people in the immediate vicinity. The flyers at the front naturally were principally in the public eye. That was the spectacular work that caught the imagination and was made much of in the war reports; and over here the various flying fields frequently got into the newspapers by reason of the occasional accidents that happened to the students in training as pilots. In other words, the outside public had occasion through the press to become acquainted only with the air service work above ground—the things pertaining to actual flying—but of the busy institutions manned by the "ground aviators," the foundation for the actual flying, and all the other activities that kept the boys in the air—these were matters that were seldom written about.

Nevertheless, behind the heroic plane fighter over the lines was a series of important factors too numerous to mention, not the least vital of which was the training field back in the States or elsewhere, where the aviator did his first "solo," probably broke several landing gears or a propeller or two, or perhaps even suffered a "crash" before he got his coveted "wings." If he was fortunate enough to escape such mishaps himself, it is almost certain that during his training novitiate he witnessed more than one smash-up, and even if the pilot in the case was not badly injured, the ruined plane must have struck his vision as a hopeless wreck and worthless for anything but the junk pile.

Function of the Repair Depots

But there is where one of those numerous air service institutions, little known to the public at large, came to the rescue. For the hopeless-looking wreck was carefully gathered up, after proper official report of the accident, and the plane duly "surveyed" by an officer—which is what happens to Government property when it becomes unfit for use—and the whole mess boxed up and shipped to the nearest aviation repair depot, to emerge soon



AN AERIAL VIEW OF THE AVIATION REPAIR DEPOT AT INDIANAPOLIS

In the center left hand corner of the picture is the building occupied by the Pomillio Bros. Aviation Experimental Works. In the upper left-hand corner is a portion of the Prest-O-Lite Factory. On the right hand side of the road running through the center of this group of depot buildings are the Administration Headquarters, the Quartermaster and Aero Supply Buildings, and the shops, the two larger buildings in the background being the Engine Repair Building and the Aero Assembly. On the left of the road are the various barracks and mess halls for the men, with the Y. M. C. A. Building and Guardhouse in the foreground. In the lower portion of the picture can be seen the open air boxing ring and basketball courts located at one end of the baseball field

afterward as an apparently brand-new spick and span machine, ready again for the air. Of course, it may not have been entirely the same plane. It might well be that it had been so badly damaged that nothing remained of the original machine but the number on the fuselage, which was always scrupulously retained even if everything else had to go by the board. But obviously the damage inflicted on planes at the flying fields was not always so great. It varied from a slight injury to the engine, or a broken strut or wire (which was remedied right at the field), to the partial or total wreck that made the machine a subject for the repair depot "hospital."

And with the wreck written off the account of the flying field and duly shipped off, it was up to the repair depot to make good, to send out in its place a perfect plane, with shining doped wings and bright new Air Service Bull's-eye, thus not only saving Uncle Sam millions of dollars by the salvaging of junk and the repair of broken machines, but also helping to maintain the supply of training planes for the thousands of fledgling pilots eager to master the air.



Turning out stick controls in the wood working department

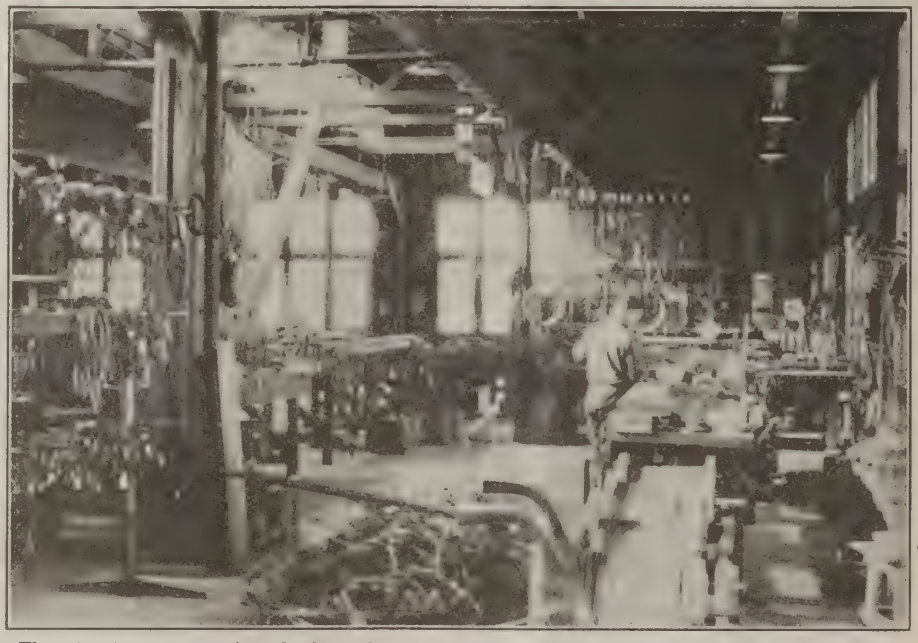
Important Improvements Devised in planes

But it was not merely in the routine repair work that these depots distinguished themselves. To them is due also the credit for making ingenious innovations in construction, resulting in greater safety for the pilot and increased efficiency of the plane. For instance, it was noticed at the Indianapolis depot that many a machine that came in for repair had the curved edge of the cowl dented where the head of the pilot had struck as the machine crashed. It was thereupon decided to cut out a semi-circular section of this cowl frame, thus making it more unlikely that the pilot's head should strike that section in a smash-up. The same thing was true of many of the instrument boards. They were so near the pilot that in a crash his head was likely to smash against it. One board, in fact, that came into the instrument room for repair showed the glass of the altimeter smashed and smeared with blood where the pilot's head had crashed into it. The instrument boards were thereafter accordingly set further away from the pilot's seat, giving him more clearance, so that as long as the safety belt held him in, his head was less likely to knock against the instrument board in front. Another important improvement showing the value of the close study given to the wrecks at this depot was the reinforcing of the longerons of the front cockpit. It was observed that in the majority of planes that had suffered head-on crashes the engine had telescoped into the cockpit. It is this kind of thing which accounts for the fact that the front-seat passenger in a head-on crash is usually the most injured, often fatally. The brace section of the longerons was therefore strongly reinforced on each side of the front cockpit, thus lessening the danger of the complete telescoping of the fore part of the fuselage, and greatly diminishing the chances of fatal injury to the occupant.

Locating the Depots

How the repair depots did all this work is one of the interesting phases of our war aeronautics. The repair depots in this country were only three in number, but they were strategically located with relation to the flying fields, and they proved themselves fully adequate to rehabilitate the planes that the boys smashed up. Although our thirty-six flying fields in the United States were scattered all over the country, there were three main groups, geographically speaking. Texas had the greatest number, with its famous Kelly Fields (numbered One and Two), Brooks Field, Post, Call, Love and Rich Fields; and so one of the repair depots was conveniently located at Dallas. Eberts Field in Arkansas, Park Field in Tennessee, Gerstner in Louisiana and the Mississippi and Florida fields were served by the repair depot at Montgomery, Alabama. Up in the northern and central parts of the Middle West were Selfridge Field at Mt. Clemens, Michigan; Scott Field at Belleville, Illinois; Chanute Field at Rantoul, Illinois; McCook and Wilbur Wright Fields at Dayton, Ohio, and Payne Field at West Point, Kentucky. This group necessitated another repair depot for their requirements, and this depot was logically and wisely placed at Indianapolis. In addition to being centrally located with reference to the flying fields to be served, the important elements in securing a good location for a depot of this kind were accessibility to sources of supplies and good shipping facilities. The Indianapolis depot was especially fortunate in these regards, for the Hoosier capital is a converging point for many railroad lines, two of which have switches running right out to the shops of the repair depot, while the market in this vicinity for tools, machinery and other supplies is exceptionally good.

The great centers of the automobile industry are only a few hours' ride distant. Raw materials like steel, lumber, and aluminum are readily obtained, and spare parts and miscellaneous supplies are within easy reach. Not only are machine manufacturers scattered all over Indiana, with the large cities in adjacent States only a jump away, but right in the city of Indianapolis itself are many motor factories, machinery, tool and hardware



The wire department where broken wires are replaced and turnbuckles are adjusted. Roebling Co.'s wire is much in evidence here, as are also the turnbuckles of the Dayton Metal Products Co., Dayton, Ohio

dealers. These concerns supplied much of the equipment of the Aviation Repair Depot located at the famous International Motor Speedway, and on innumerable occasions the proximity of these concerns rendered it possible to obtain immediately tools and other supplies on emergency orders, saving days and weeks of time that would have elapsed in getting material from a distance. This meant that jobs were seldom held up for want of needed material.

The plant is located about six miles out from Indianapolis, not far from the motor race track, the inside field of which is used by the Repair Depot as a flying field. Here planes that come for overhauling, and visiting aviators, land; and here also the repaired planes destined for fields in the immediately surrounding States are assembled, tested by civilian aviators employed for the purpose, and flown away. The Motor Speedway is used in this manner through the courtesy of Messrs. Carl G. Fisher and James A. Allison, of the Speedway Corporation, which also erected two hangars on the field and placed them at the disposal of the Government. The Repair Depot grounds occupy about twenty acres adjoining the Prest-o-Lite factory and the plant of the Pomillio Bros. Aviation Experimental Works. Construction was begun in November, 1917. The score or more of buildings of the depot represent an outlay of $650,000; the machinery and equipment were installed at a cost of $84,803.25. With leasehold rights and improvements, the total value of the plant approximates $800,000, and, including the stock on hand, the value of the entire depot in buildings, property and equipment exceeds $1,500,000.



Major Patrick Frissell, J. M. A., Commanding Officer, Aviation Repair Depot, Indianapolis

Fire protection naturally had to be of the best, not merely on account of the value of the equipment in the shops, but because the destruction of the plant during the war would have meant a serious delay in time required to replace it. The overhead sprinkler system of the International Sprinkler Company of Philadelphia was therefore installed, while numerous hand fire extinguishers were scattered plentifully throughout the shops, from the small Fyr-Fyter type to the larger Stempel Army Fire Extinguishers, and also the Badger Company's product.

The mechanical equipment of the three aviation repair depots is practically the same, for the same kind of work, so that



INTERIOR OF THE DOPE HOUSE

Where thousands of gallons of Dupont Dope and Sherwin Williams' Paints and Varnishes have been used



An aeroplane wreck showing the condition in which they sometimes come to the repair depot

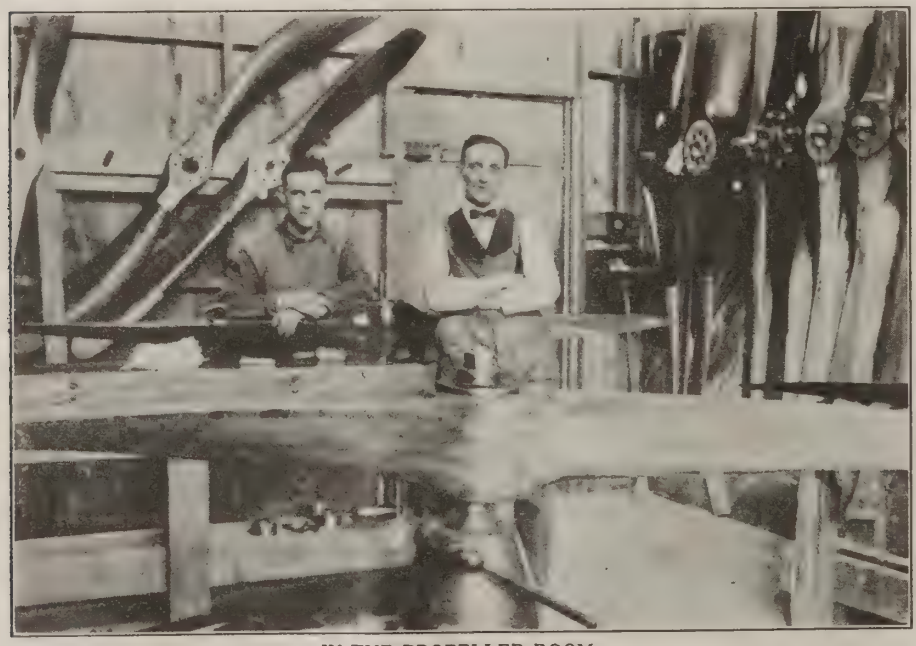


THE WOOD WORKING DEPARTMENT

In this well-equipped shop can be manufactured every wood part of an aeroplane except the propeller. The equipment includes a drill press, boring machine and cross cut saw, all from the J. A. Fay & Egan Company, Cincinnati; jig saw, wood lathe, shaper, plane surfacer, grind stone and saw, from the American Wood Working Machine Company, Williamsport, Pa.; band saw, Crescent Machine Company, Leetonia, Ohio; emery wheel, Hisey-Wolf Machine Company, Cincinnati; oil stone grinder, Mummert-Dixon Company, Hanover, Pa.; vises and files for filing and setting saws, Machinery Company of America, Grand Rapids, Michigan; wood machinery, Frank K. Moore, Boston; belt sander and cross cut saw, Oliver Machinery Company, Grand Rapids; rip saw and 24" planer, J. T. Townsley Company, Cincinnati; self feeding rip saw, Sinker-Davis Company, Indianapolis, and an Eaglesfield 6" molder, Vonnegut Machinery Co., Indianapolis. Westinghouse motors are also used for driving the machinery and a plentiful supply of LePage's Glue is found on the benches in this shop. The lumber comes from the Johnson Lumber Co., of Indianapolis

the Indianapolis depot may be taken as typical in this regard. The machines and tools were selected by Army aviation officers of exceptional engineering experience, and represent the result of their expert knowledge of the entire machinery field, and the requirements of aeroplane construction and engine repair. Responsibility for the proper equipment of the shops and the efficient training of the personnel fell on the shoulders of the first commanding officer, Major (now Lieutenant-Colonel) Guy L. Gearhart, and Captain Edward Laughlin, who was the chief engineer officer.

The plant management system was organized on a basis of practical up-to-date efficiency. The best shop methods in America were studied. Unnecessary routine and paper work were abolished, and red tape was not allowed to stand in the way of securing a needed bolt or screw or other supplies. No job was held up for lack of material. Supplies were obtained without delay from the nearest stockroom. The tool room was placed in the center of each shop, making a trip to it of equal distance for all the workers, and the brass check system adopted for checking out tools. The time clock was applied both to the men and the particular job which was going through the shop. Dealers in supplies were card indexed and their promptness in making deliveries recorded. Delays were noted against the offenders and future orders given to the prompt ones. Shop and work forms were devised after careful study and adopted for use in connection with each job and all shop routine. These forms include the "Dismantling Record," "Dismantling Report," "Assembly Report," separate inspection reports for fuselage, wings, ailerons, landing gear, propellers; production and cost records, "Motor Test Sheet," time tickets for jobs, stock room requisitions, work orders, daily return for each department showing work done, "Receiving Report," "Transfer of Materials," and different colored tags showing parts "O. K. for Service," "Condemned" and "To Be Repaired." There are also time cards for the men and "Records of Transfer" for use when the worker is detailed from one department to another. In addition to all these, there is a large manila folder with a comprehensive form printed on it, which is used for a complete "Repair Record and Cost," and on which is noted all the data relating to the history of a job from its receipt to delivery.



IN THE PROPELLER ROOM

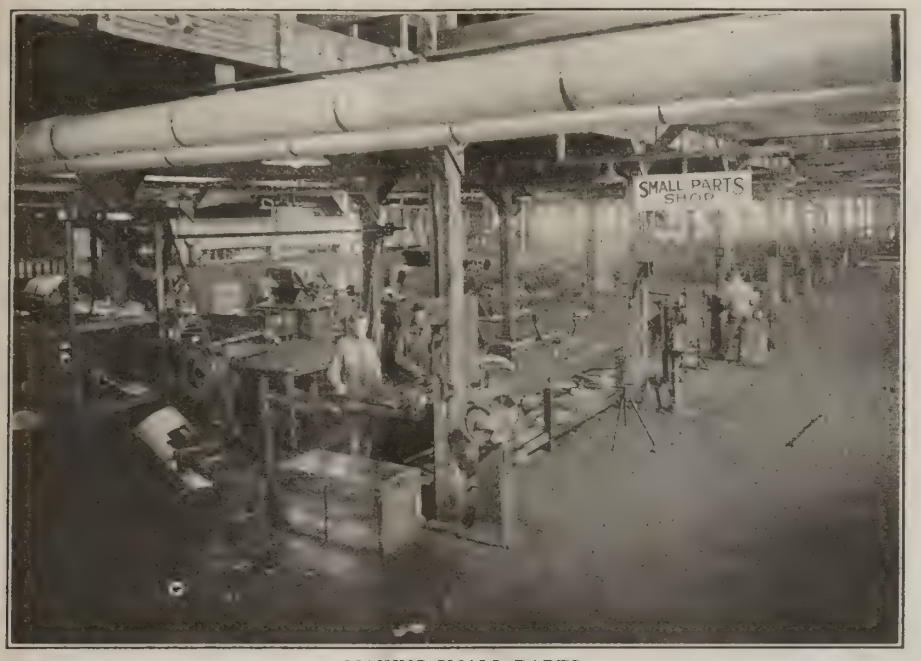
A propeller is seen on the balance stand (Rockford Tool Company, Rockford, Ill.), and other equipment includes a propeller vise (J. A. Fay & Egan Company, Cincinnati), and a bench planer (J. D. Wallace Company, Chicago). The Star Piano Company, of Chicago, has been furnishing propellers

Record of Production

The Indianapolis Depot was the first of the repair institutions to be equipped and get under way into actual production. The initial wreck arrived in April, 1918. At first progress was slow and gradual, due to the lack of the necessary blue prints, specifications, etc., and to the need for instructing the raw "ground aviators" in their new work. Very soon, however, a rate of a plane and an engine a day was reached, which was the estimated output on which the plant was built. Not long afterward, however, this depot adopted and lived up to the slogan of "Three a Day," actually turning out onto the shipping platform three engines and three aeroplanes in each working day. Although at times the wrecks only trickled in one by one, there were other occasions when they came in flocks—as, for instance, after the disastrous hurricane at Gerstner Field, Lake Charles, Louisiana, last year, when one hundred of the broken planes from that point were received at the Speedway Depot; and some months later sixty DeHavilands recovered from the sunken *Americus* were sent here for salvaging.

Up to the end of 1918 planes to the number of three hundred and thirteen had been repaired at the Speedway, with a valuation of $1,195,550; and 350 aeroplane motors with an approximate value of $638,699. Also $300,000 worth of wings, ailerons, elevators, rudders, stabilizers, struts, and miscellaneous fittings had been turned out. The entire value of aeroplanes, motors and parts repaired at this depot up to January 1, 1919, exceeded $2,130,000. Since the signing of the armistice the work has naturally slowed down somewhat, due both to the lessening of the incoming wrecks and to the partial demobilization of the soldier workmen. The total of planes produced up to March 3, 1919, however, was 352 and the engine total was 371.

The Montgomery, Alabama, Depot was not completed until July 1st, 1918. In its eight months of operation up to March 1,



MAKING SMALL PARTS

The Small Parts and Welding Department is equipped to fashion any of the great variety of the small metal fittings that go into aeroplane construction, and also some larger ones like engine hoods. This work requires, among other things, a rotary shear (Otis Fuller, Goshen, Indiana), a casting form for engine hoods (Hetherington Burners, Indianapolis), solder furnaces (Superior Solder Furnace Company, Warren, Pa.),feeding and turning machines, metal roller, mandrel, 30" square shear, eight foot and four foot brakes, all from the Peck, Stow & Wilcox Company, Cleveland; splitting shear (Niagara M. & T. Works, Buffalo), pattern filing machine (Oliver Instrument Company, Adrian, Mich.), bench and mandrel presses (Atlas Company, Kalamazoo), drill press (Patterson Tool & Supply Company, Dayton, Ohio), bench shear (Vonnegut Company, Indianapolis), a gang punch and bench shear, from the Badger State Machinery Company, Jamesville, Wis.; emery stand (U. S. Electrical Tool Company, Cincinnati), and a Gray's Sheet Metal Cutter (W. J. Savage Company, Knoxville, Tenn.). The sheet metal is supplied by the Langencamp Co., of Indianapolis

1919, this Depot turned out 155 planes and 187 engines.

Most of the repair work has been on the Curtiss types, the J. N. 4D and the J. N. 4H, with Curtiss O. X. 5 and Hispano-Suiza motors; also Curtiss planes with gun equipment, and some with photographic equipment. A number of De-Haviland planes have also gone through the shops. Various other types, such as Thomas-Morse, and some "hybrids" and obsolete machines of one kind or another have at different times found their way into the depot. Earlier in the history of the plant Standards were also worked on, and one of the big Handley-Page machines is now awaiting repair at the hands of a competent force of aeroplane mechanics. The training of these mechanics was in itself a notable achievement. The Indianapolis personnel consisted of some thirty officers and four aviation repair squadrons, the 809th, 810th, 811th and 821st (150 men each), with medical and quartermaster detachments in addition. Three of the squadrons came from the big air service mobilization camp at Kelly Fields, Texas, and the fourth was recruited from Indianapolis and the vicinity. About four hundred and fifty of the six hundred squadron men were gradually absorbed into the shops, and these, together with thirty-two civilian employes, made up the working force. The soldier workmen, although belonging to aviation repair squadrons, were by no means expert aeroplane mechanics when they arrived.



A CORNER IN THE INSPECTION DEPARTMENT

This department makes use of many instruments for exact and minute measuring and gauging, such as micrometers and calipers manufactured by the Brown-Sharpe Company, Providence, R. I.; the Scleroscope for testing the hardness of metals (Shore Instrument & Mfg. Co., N. Y.), as well as ordinary small Buffalo Scale Company's weighing scales. Some of the micrometers are also furnished by the L. S. Starrett Company, Athol, Mass.

Making Aeroplane Mechanicians

How Uncle Sam secured a competent body of aviation shop workers is an interesting story in itself. In fact, one of the remarkable achievements of the American Air Service has been the enlisting and inducting of a large mass of miscellaneous civilian mechanics, the vast majority of whom had never had anything to do with aeroplanes before, and turning them in a few short months into expert aeroplane workers. Outside of the privately owned aircraft factories, aeroplane mechanicians were practically nonexistent. The trade had not assumed a standard and recognized place in our industrial life. With the entrance of the United States into the war and the planning of the great air program the country was combed for mechanics and tradesmen of all kinds whose experience rendered them valuable in the construction of various parts of an aeroplane. These included automobile body builders, motor mechanics, blacksmiths, carpenters and cabinet makers, chauffeurs and garage men, metal workers, welders, draftsmen, electricians, tailors and sailmakers, watchmakers and instrument workers, painters, plumbers, and a variety of other kinds of tradesmen, as well as the necessary number of clerks and cooks.

To train these men and adjust their skill to the repair and manufacture of aeroplanes was the immediate task of the Government Air Service. A good deal was accomplished by the establishment of enlisted mechanics' training schools, where the men were given short intensive courses in aeroplane engines, wing and fuselage construction, as well as in aeroplane nomenclature. These men were formed into repair squadrons and shipped to various points for duty or further training. The squadrons which came to the Indianapolis Depot were carefully trade-tested to record their experience and skill in certain lines, and were then put to work at the jobs best suited to them in the repair shops. These shops had their several departments devoted to all the various kinds of aeroplane work. Automobile motor men quickly learned the construction and operation of aeroplane engines; carpenters and cabinetmakers were shown how to apply their skill to the making of longerons, struts, skids, wing sections, and other wood portions of the aeroplane; metal workers learned how to fashion the small metal parts, tailors were taught how to sew the linen on the wings, painters were quick to learn the knack of applying dope varnish to the finished wings and the body of the plane, and so on. Enlisted men of various trades were thus utilized, each for work in his own line, in repairing and rebuilding machines with which they had had no previous experience. Under careful instruction and supervision this body of green aeroplane mechanicians developed into expert workers, producing for this one depot alone a daily output of engines and aeroplanes that would have

THE AERIAL CARNIVAL AT FORT OMAHA

AN aerial carnival was held at the Fort Omaha Balloon School on July 13 for the purpose of stimulating recruiting in the balloon section of the Air Service.

The main events of the day was the balloon race, of which a summary follows:

Balloon No. 2, "All America," First Lieut. Richard E. Thompson, pilot; Second Lieut. James B. Jordan, aide; left at 8:52 P.M., 13th. Landed 9 miles southeast of Portage, Wis., 1:45 P.M., 14th. Maximum altitude, 12,500 feet. Time in air 16 hours and 53 minutes. Distance traveled 409 miles. First place.

Balloon No. 1, "United States," Captain Ashley C. McKinley, pilot; Second Lieut. James T. Neely, aide; left at 8:58 P.M., 13th. Landed 6 miles south by west of Rowley, Iowa, at 12:01 P. M., 14th. Maximum altitude 9,000 feet. Time in air, 16 hours and 3 minutes. Distance traveled, 136 miles. Second place.

Balloon No. 3, "Victory," Second Lieut. William E. Huffman, pilot; Second Lieut. William E. Connelly, aide; left at 8:55 P.M., 13th. Landed at 1:20 P.M., 14th. Maximum altitude 7,200 feet. Time in air, 16 hours and 25 minutes. Distance traveled, 211 miles. Third place.

Balloon No. 4, "Cannon Ball," Mr. A. Lee Stevens, pilot; Lieut. Col. Jacob W. S. Wuest and Major Martin J. O'Brien, aides; left at 9:03 P.M., 13th. Landed four miles south of Ringstead, Iowa, 3:48 A.M., 14th. Maximum altitude 6,600 feet. Time in air, 6 hours and 45 minutes. Distance traveled, 158 miles. This balloon contained the judges for the race.

Balloon No. 4, "Cannon Ball," entered terrific thunderstorm at 2:10 A.M. Encountered cyclonic winds over Minnesota Lakes and forced southeast, and finally beaten to the ground at 3:48 A.M.

Other balloons encountered same storms, but were apparently at their outer edge, so continued the race.

Balloon No. 2, "All America," won a silver loving cup and the pilot and aide were awarded gold wrist watches donated by the Omaha Chamber of Commerce and the Board of Governors of the Ak-Sar-Ben Club of Omaha.

Balloon No. 1, "United States," and Balloon No. 3, "Victory," won second and third prizes, respectively, consisting of silver cirgarette cases appropriately engraved for the pilots and aides.

The prizes were presented in person by Colonel C. De Forrest Chandler, chief of the Balloon and Airship Branch, Air Service, at Fort Omaha, on July 22, 1919.

Lieut. Colonel Jacob W. S. Wuest, J.M.A., A.S., M.A., commanding officer, presided at the ceremonies.

The hearty co-operation accorded it by the officers and men of the post and by the leading business men of the city of Omaha insured the overwhelming success of the carnival.



The official announcer at the Aerial Carnival at the Fort Ohama Balloon School was suspended 100 feet in the air from a captive balloon

Due to efficient organization the various committees performed their plans without hitch. The scope of their activities may be judged by the following list showing their organization and membership:

Commanding Officer—Lieut. Colonel Jacob W. S. Wuest.

Adjutant—Major Martin J. O'Brien.

Director of the Carnival—Mr. A. Leo Stevens.

Grounds and Property—Major R. T. Crawford, Second Lieut. R. S. Hall. (a) Decorations—Captain C. R. Jacobson, Second Lieut. W. E. Connolly. (b) Construction—First Lieuts. W. C. Burns and H. C. MacNeill. (c) Reception and Entertainment—Captain A. C. McKinley, Captain S. L. Dowd.

Balloons—Second Lieuts. R. A. Reynolds, W. E. Huffman, R. Robertson.

Athletics—Second Lieuts. J. O. Tooley and Mr. D. J. Ryan.

Transportation and Traffic—Captain C. F. Adams, Second Lieut. R. P. Clapp.

Refreshment and Concessions—Second Lieuts. G. G. Lundberg, R. G. Conklin and J. B. Jordan.

Publicity—Major M. J. O'Brien, Second Lieut. J. T. Neely, Mr. A. Leo Stevens.

Recruiting—First Lieuts. R. E. Thompson, J. M. Riggs.

Contests and Records—Second Lieuts. C. L. Meisinger, A. H. Foster.

Police and Fire Protection—Captain H. T. Lewis.

Program—First Lieut. H. C. MacNeill, Second Lieuts. J. T. Neely, G. G. Lundberg, W. E. Connolly and Mr. A. Leo Stevens.

Athletic Events—Starter, Second Lieut. J. O. Tooley; judges, Second Lieuts. J. R. Hall, H. S. Froehlich and Mr. D. J. Ryan.

It is estimated that over 25,000 people witnessed the carnival, and all the events went off smoothly and according to the program, in spite of the high winds.

An added attraction was the appearance of two aeroplanes from the hangars of the Omaha Flying Company, which circled the field and took pictures of the events from the air. Moving pictures were obtained of the officers who participated in the flying events and of a parachute drop. These pictures were all displayed at local theaters throughout the following week, the audiences showing intense interest in them and applauding heartily.

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600 Mile Balloon Flight

Post Field, Fort Sill, Okla.—Pilot Lieutenant Hoke S. O'Kelly, with Lieutenants Carlton F. Bond and William H. McIlwain, and Sergeants Louis N. Morris and Edwin Schneider as passengers in a 35,000 cubic feet free balloon, made a flight from Post Field to Lexington, Neb., 600 miles, in 31 hours. Maximum altitude 5,400 feet. Five landings made en route.



From left to right, Cacquot observation balloon, German Drachen, nurse balloon, Italian A. P. observation balloon. The small balloons in the air are propaganda balloons

TESTS ON THIN PLYWOOD AS A SUBSTITUTE FOR LINEN IN AEROPLANE CONSTRUCTION

By ARMIN ELMENDORF*

THE use of thin sheets of wood properly glued together in place of linen for aeroplane covering has long been considered as a possibility. Veneer of some species may be cut into large sheets only 1/150 inch thick. When three sheets of such thin material are glued together, a covering is obtained whose weight compares quite favorably with that of doped aeroplane linen, so that there is some reason for considering wood as a material for covering, although at first thought it might seem to be out of the question on account of its apparent excess weight.

In view of the frequent demand for information upon the properties of thin plywood and its uses in aeroplane construction, tests were initiated at the Forest Products Laboratories of the U. S. Forest Service, at Madison, Wis., to determine the merits of thin plywood as a covering for aeroplane surfaces. While it was possible to prepare very thin sheets of three-ply wood that would be as light as doped linen, a few attempts at gluing such material soon showed that the difficulty of handling the veneer made the manufacture of plywood of this kind impractical, at least in the present stage of the plywood industry. A few tests also showed that very thin plywood lacked toughness and tearing strength, and there seemed to be little hope of using the lightest plywood. The tests were, therefore continued on somewhat thicker material with the surmise that the heavier plywood might possess other properties that would compensate for its excess weight.

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Figure 1

Method of measuring the toughness of thin plywood sheets by dropping a 3.27 pound iron ball upon the center of the test specimen



Figure 3

Measurement of rigidity by the magnitude of the load on a given deflection, determined by sand load test

The relative importance of the various properties desired in an aeroplane covering is not established. Each of the following properties is, however, of sufficient consequence to merit consideration: (a) Minimum weight consistent with safety; (b) high tensile strength; (c) high toughness, or resistance to blows tending to rupture the covering; (d) high tearing strength; (e) high rigidity, or minimum stretch under load; (f) maximum stability; (g) resistance to fire.

Tests made by many experimenters with the use of a variety of chemicals have shown that wood may be impregnated with solutions that render it highly fire-resistent; consequently, no special work was undertaken to treat thin plywood for this purpose.

Tests were devised to measure the quality of the material in each of the other properties mentioned above, and the results, obtained from more than two thousand such tests, are here briefly considered.

Practically all the material tested was glued at the Laboratory by the tissue process, in which a sheet of tissue, previously soaked in blood-albumin glue and dried, is inserted between two sheets of thin veneer and then pressed in a hot press to set the glue.

Among the species that may be cut into very thin veneer are Spanish cedar, mahogany, birch, sugar maple, red gum, yellow poplar, and black walnut. The veneer of these species may be satisfactorily glued by the tissue method.

Three constructios of thin plywood were prepared: First, a three-ply construction in which the grain of the center ply was at right angles to the grain of the face plies; second, a construction in which a piece of cloth was incorporated between two veneer plies having their grains at right angles; third, a construction in which a piece of cloth was glued between two plies of veneer, whose grains made an angle of 60 degrees with each other.

Weight

The weight of aeroplane linen given five coats of dope at the Laboratory was about 0.9 ounce per square foot, while the minimum weight of three-ply Spanish cedar made of 1/150-inch veneer was about 1 ounce per square foot. Thin plywood constructions that were considered satisfactory from the point of view of facility of manufacture and with respect to strength and toughness weighed slightly more than 2 ounces per square foot. In constructions of this kind a

sheet of cotton cloth was glued between two sheets of this veneer, the thickness of the veneer used being about 1/60 inch for low-density species, such as basswood, Spanish cedar, and yellow poplar. For high-density species, such as birch, beech, and sugar maple, a veneer thickness of about 1/80 inch gives a plywood weight of from 2 to 2.5 ounces per square foot. A large part of the weight of thin plywood lies in the glue.

Tensile Strength

Strips one inch wide were tested in tension, their ends being held between flat grips, in an ordinary Olsen testing machine calibrated to read to one pound. In the case of three-ply wood, tension tests were made both in the direction of the face grain and in the direction of the core grain. In two-ply construction, where the plies were glued so that the grain of one face was at right angles to the grain of the other face, the tests were made parallel to the direction of the grain of each face. In two-ply construction, where there was an angle of 60 degrees between the directions of grain in the face plies, the plywood was tested in the two directions bisecting the angles between the grains of the faces.

A two-ply construction in which the grain of one ply makes 90 degrees with the grain of the other ply should have the same tensile strength in the direction of the grain of each face, which is practically equal to that of the single ply of veneer. The tensile strength of birch veneer is about 20,000 pounds per square inch at 8 per cent moisture. From this it is seen that the strength of a straight-grained ply 1/80 inch thick should be about 250 pounds per inch of width, which is more than three times as great as the strength requirements of Grade A aeroplane linen. The two-ply, 90-degree construction described gave entirely satisfactory tensile strength. The two-ply, 60-degree construction gave relatively low tensile strength. It was stronger in the direction of the grain of the veneer than in the direction in which the tests were made.

Toughness

In addition to being strong in resisting a tensile load slowly applied, aeroplane covering must also offer resistance to sudden blows, such as would result from striking brush on landing or dropping tools while assembling or repairing the machine. The method used by the Laboratory for measuring the toughness of thin plywood sheets is shown in Figure 1. A cast-iron ball weighing 3.27 pounds is dropped upon the center of the test specimen, which is tacked upon a frame 18 inches square inside. The ball is dropped upon the center of the panel from various heights, beginning with a ½-inch drop and increasing by ½-inch increments. The height of the drop at which the ball passed through the panel was recorded as the measure of toughness.

The tests showed conclusively that very thin three-ply wood, such as that made of Spanish cedar veneer 1/150 inch thick, is low in toughness, and for that reason is not satisfactory as a substitute for linen. In order to improve the toughness of thin plywood made of veneer thinner than about 1/50 inch, it was found necessary to incorporate a cloth fabric between the plies. Aeroplane cotton, Grade A, proved to be very satisfactory for this purpose.

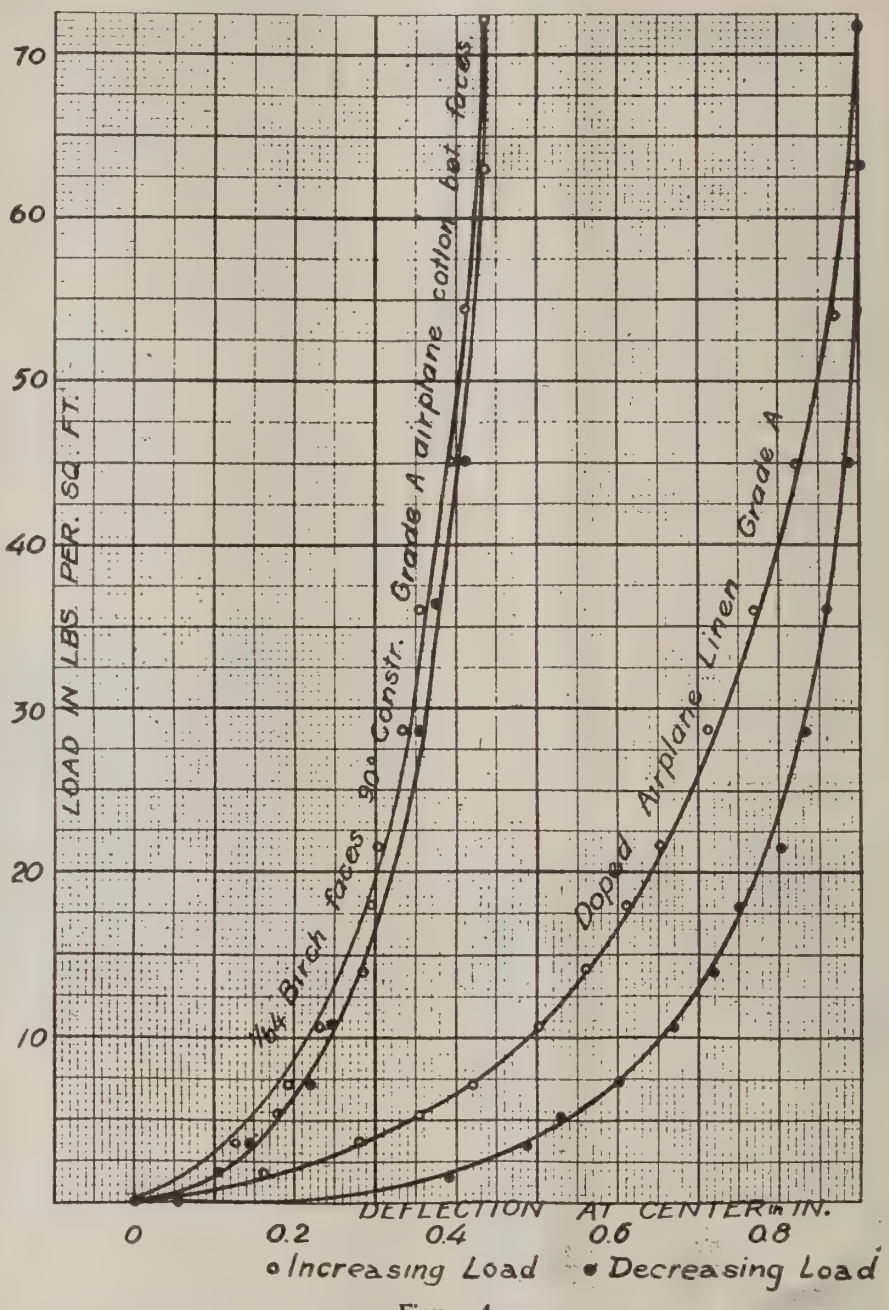


Figure 4

Load deflection curves. Sand load tests on plywood panels. Panels tacked on frames 18" x 18" inside dimensions

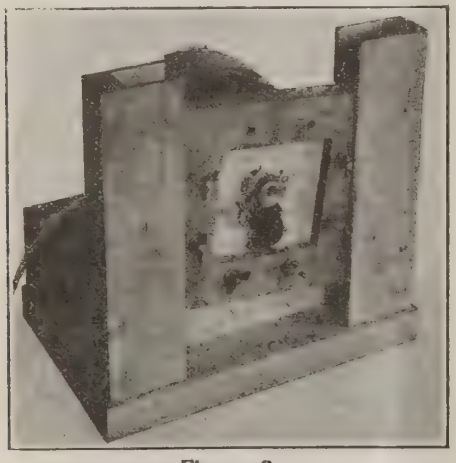


Figure 2

Apparatus for simulating whipping action to test the tear in an aeroplane covering ruptured by a projectile

Tearing Strength

When ruptured in flight by a projectile, an aeroplane covering may develop a serious tear, especially in the slip stream of the propeller, where it is subjected to the rapid succession of air pulsations. It was thought that such repeated stresses could be simulated by the whipping action of the apparatus shown in Figure 2. The test sheets were fastened in a wooden frame. A hole through the specimen admitted a cam mounted on a motor shaft operating at 1,800 r.p.m., the weight of the frame and sheet under test being supported by the cam. The throw of the cam, although only 1/16 inch, caused the frame to vibrate or shake in its guide so that the cam tore a gap in the plywood. The time to tear a gap one inch long was taken as the basis of comparison of the relative tearing resistance of the material.

The very thinnest three-ply wood made

(*Continued on page* 1147)

PRELIMINARY NAVAL FLIGHT INSTRUCTION

By NICHOLAS S. SCHLOEDER

(*Concluded from page* 1057)

Spins

SPINNING nose dive is a broad term, applied to all manoeuvers which include a rapid descent, nose down, accompanied by rotation about an axis more or less coincident with the fuselage. This includes a tailspin, though in this country, there is a tendency to restrict the term to convolutions in which the axis of the machine is perpendicular and the descent and spin very rapid. There is unquestionably a distinction, involving certain pecularities about a common principle.

The three underlying principles of spins involve torque, the screw effect of divergent surfaces (rudder and elevator out of neutral), and the use of ailerons. Any or all of these may be included. The first two are the prime factors in a tailspin, the last, of a spinning nose dive (in the narrow sense). Loss of speed induces the first, speed the last one.

Consider torque first. The constant functioning of all the aerofoil surfaces alone prevents a machine from spinning in a direction opposite to that of the propeller, with the propeller shaft as the axis. Now when loss of speed occurs, as in a stall, the surfaces cease to function and consequently the machine starts to turn and rotate to the left. This is a common experience with power loops. Hence, climbing unduly on left turns, followed by a loss of aerofoil function, directly contributes to a spin. Even with the motor throttled, torque will assist. Whence all ordinary machines spin faster and easier to the left, especially with scouts with slow-speed motors of proportionately greater torque. While torque is thus merely a contributing factor, it is yet largely responsible for accidental spins by students, which are invariably to the left.

Briefly, the theory of a true tailspin lies in the screw action of divergent or off-set tail surfaces. In other words, the elevator is pulled back and the rudder is hard over.

The action of the elevator and rudder is as follows: The elevator function at first is very similar to that resulting from a stall, that is, if we eliminate the effect of the raised elevator during a tail slide. Inasmuch as the center of gravity is below the center of lift of the machine, and about in line with it on its fore and aft axis, it is evident, as the elevator is raised and the machine begins to stall, that the center of gravity moves in front of the center of lift. The nose of the machine is lifted by the depressing effect of the raised elevator, which thus acts as a lever with the center of lift as the fulcrum. Now, loss of speed follows a stall, and, as before mentioned, the center of gravity moves in front of the center of lift; hence, the elevator has more work to do, with less power of doing it, because the reduced speed diminishes its action. Consequently, the nose of the machine drops suddenly. Now, when the nose drops, speed is quickly regained, restoring the leverage of the elevator, which ordinarily, would again raise the nose. Another factor, however, prevents this, namely, the rudder.

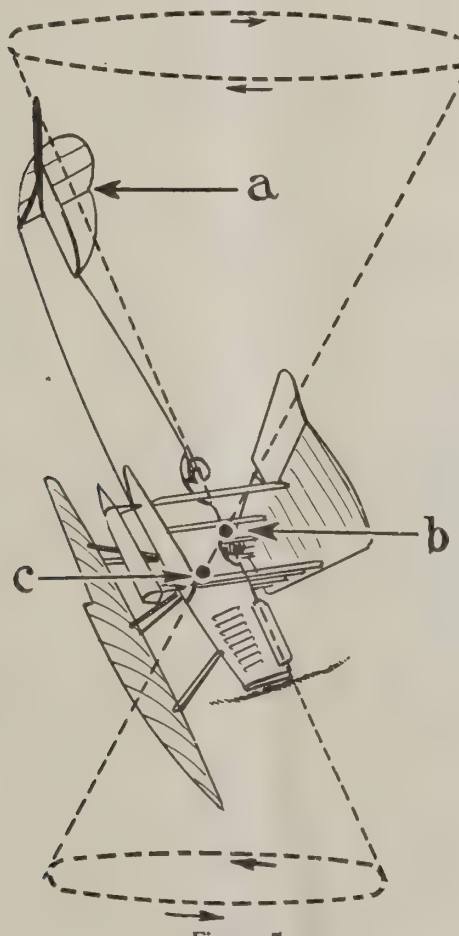


Figure 5

Diagram of a tail spin: , tail surfaces; *b*, fulcrum; *c*, center of gravity

A vertical keel surface is necessary for elevator action, otherwise the tail might slip off one way or other laterally, under stress. Hence, when such a keel plane surface is divergent, in the form of rudder "hard over," not only is the neutralizing effect of the prevention of lateral slip negatived, but it will give the direction of that slip. This actually happens, for it becomes easier for the elevators to slip off to one side, directed by the rudder, than it does to lift the nose, a spinning motion being thereby imparted, as is self-evident.

A machine in the position indicated by Fig. 5 is acted on by a set of opposing forces whose operation may be compared to a lever, the fulcrum being the center of pressure on lift of the main planes, with the elevator on one arm tending to lift the nose, while on the other the center of gravity holds it down; a dual decided by the rudder in favor of gravity.

As a practical matter, any position with elevators raised, rudder over, will result in a spin. The simplest way to spin is to throttle the engine, holding machine up, slowly pulling back controls to chest and then applying hard rudder. Some pilots first go into a stall, with or without power. Too much down rudder on a "flipper" turn or spiral will also cause a spin. Loss of speed where torque is involved will likewise contribute. Loss of speed is never otherwise the direct cause of a spin, as is sometimes erroneously supposed, but merely goes with the assumption of the screw position of the tail surfaces.

Neutralization of tail surfaces will immediately stop all normal spins. Only where torques or ailerons are involved, will any further action be necessary, such as ruddering against. In flat spins, rudder against. In accidental spins to left, cut spark. If from flipper turn or spiral, release wheel momentarily, which will neutralize ailerons. Always neutralize elevator, never more.

A spinning nose dive, in the narrow sense, is applied to a fast perpendicular spin which may be the result of several contributing factors. As will be seen by examination of diagram, the greater the relative force of the tail surfaces, the flatter will be the spin. Therefore by easing off on the tail surfaces, the descent will be made more precipitate. If at this time ailerons be used with the spin, this acts as a screw about their common center of pressure, which of course, is midway at the nose. Hence this tends to keep the nose down, and likewise more than compensates for loss of rotating moment.

In practical flying, a spinning nose dive often results from a "flipper" spiral, as the ailerons are held over. By aileroning with any ordinary spin, a spinning nose dive may be produced. To come out of it, it is necessary to add one feature to the ordinary practice of a neutralization of tail surfaces, i. e., by momentarily relaxing hold on the wheel the ailerons neutralize themselves at once. Pressure on ailerons may be very great in a spinning nose dive; indeed it is an effort to hold them over.

Taxiing On Water

Ability to manoeuver machine while in the water, particularly upon the final return to the beach, is of great importance. Indeed, collision with other machines along the beach is responsible for more minor breakages than any other mishap. The rules are simple, yet confusing.

If the approach to the beach involves a head wind, the controls are used quite as in ordinary flight, though with greater radius. If the wind is more or less parallel to the beach, and in order to keep machine on desired course it is necessary to turn nose to the windward, simply throttle engine. The machine acts as a weather-vane and swings into the wind. To turn nose to the leeward, open throttle and apply rudder as

usual. Never attempt to turn into wind by aid of rudder with power on. Furthermore, it is desirable in such cases to approach beach from leeward side. If a tail wind prevails, greater than the speed of taxiing, reverse control becomes necessary. Hence, in right turns, give left rudder; the wind catches the rear of the rudder surfaces which swing tail to left. Similarly to raise nose in choppy water, throw yoke forward as the wind strikes the upper surface of the depressed elevator and lowers the tail.

Ailerons assist in manoeuvering on the water. When machines are equipped with wing tip pontoons, ailerons are used to immerse pontoon on side toward which it is desired to turn, which thus acts as a pivot for a rapid turn. With engine throttled, always use reverse control.

Generally speaking, it is easier to turn to left than right because of torque. Approach beach as slowly as practical. Never head toward beach while still on the step, unless at a considerable distance. When leaving beach, proceed gradually; do not throw blast back on bystanders.

Flying Boats

Before concluding these remarks I will take up the special peculiarities of flying boats.

The differences of boat control is due to the peculiar distribution of the centers of lift, gravity, thrust and resistance It is exactly the reverse of that in tractor machines, and, theoretically, with the possibility of engine failure present, it is a more unstable arrangement. The center of thrust is above the center of resistance, the center of gravity behind the center of lift.

With power on, it can readily be seen that the first compensates the second, for the high thrust tends to depress the nose; the center of gravity to raise it. Now, with power off, this heavy tail condition is neutralized by a lifting tail; hence the necessity of throwing the controls forward and holding them in a glide. Where bank is involved, there is a tendency for the nose to come up, as may be assumed, since the high thrust no longer acts directly downward, but at an angle. Therefore "down rudder" can be used with greater freedom with steep turns than in the operation of tractor machines.

Another peculiarity is the balanced ailerons which makes their operation easy and which leads to overcontrol by the pilot. Furthermore in taking off, there is the sharp swerve to the left which the boat makes as it goes on the step and the tail lifts out of the rudder. This is only momentary and is compensated by a temporary application of hard right rudder.

The difficulty of F-boats is constituted largely by their difference from tractors, and not to an inherent complexity of operation. In fact, landings are easier for beginners, and I have succeeded in qualifying with them for solo by a measurably shorter period of instruction than with N-9's.

Students must be taught to operate F-boats from the left seat. The advantages of this are: (1) They may operate the throttle with the right hand, as customary; (2) Most instruments are on the left side, particularly, when later, they operate H-boats; (3) The fault of climbing on left turns is practically eliminated, as the student is on the inner and *lower* side when turning; the outer side of the bow above him tends to make him keep the nose down. The opposite is true of right hand turns, as he is then on the outer and *upper* side, but in this case a low angle of incidence is not so necessary; (4) As the bow of the machine slopes slightly from the center, there is a tendency among boat pilots to lower the wing on the opposite side; if the right wing is low it is more advantageous than the other, for, as before explained, the slight side slip compensates for torque and decreases the strain on right rudder.

The Aeromarine has an unusually high effective angle of climb, but the speed at such angle is very low. Consequently, the tail surfaces are not very effective, which leads to careless work, particularly with the rudder, which, shoved hard over, may lead to a spin. Otherwise I have discovered no particularities.

Care of the Machine

In conclusion, I migh state that the care of machine, knowledge of engine and detection of trouble; safety measures, such as examination of controls before flight, acquaintance with rules of the course; a constant lookout for other machines; the technique of the instruments, aerography, etc., are matters of vital importance. However, I haven't elucidated them as the strict compass of this paper aims to be nothing more than a treatise on actual flight instruction. Local conditions modify rules, and the student is referred to motor men and technicians for other points. Nor have I discussed the difficulties of aerial acrobatics, as I believe they are not within the compass of preliminary instruction.

A COMPENDIUM OF MISTAKES MADE BY STUDENTS

In Take-Offs

(1) In taking off, most students held controls forward too long after they had succeeded in getting the machine to plane on the step, which thereby caused it to "porpoise."

(2) Many students attempted to arrest a porpoise by movement of the elevators, instead of by withdrawing them to neutral.

(3) Many students dragged machine off water before it had attained sufficient flying speed, by holding controls too far back, which resulted in a series of bounces and the assumption of a dangerously high angle of climb upon finally taking the air, which at times almost resulted in a stall.

(4) Many students attempted to rock machine on the step by a vigorous movement of yoke back and forth, instead of a slight movement about neutral in rythm with the natural rock of the machine.

(5) All students have permitted wing tip pontoon to bury itself in the water when attaining step, which caused machine to swerve in its direction, and therefore out of the wind.

(6) Most students underestimated the amount of rudder control necessary before attaining step, which is considerably greater than that needed while planing or in flight.

(7) Many students after landing, and I had opened the throttle to proceed, lost sight of fact that the machine had not settled into water, but was still planing on step, so that when they threw yoke forward as if to attain the step, the nose was depressed suddenly and dangerously.

In Flight

(8) Most students failed to hold their course in straight flight until after some experience, and permitted machine to swerve gently to left because they did not maintain pressure on right rudder consistently.

(9) Some students on the other hand, held right rudder too steadily; hence did not have the much-needed flexibility in rudder action, which resulted in yawing.

(10) Many students flew with right wind low, because of insufficient right rudder; some with left wing low, because of too much right rudder.

(11) Many students attempted to affix certain point on rocker arms or machine and "line it up" with horizon. Too much reliance on this led to great confusion in absence of a clearly defined horizon, when obscured by mist.

(12) A common method of confusing horizon occurred as students approached mainland from the sea. They confused the edge of the shore with the horizon; hence, as they approached land, the nose dropped and the angle of climb decreased until it fell below normal.

(13) Some students interpreted injunction to nose down in rough weather to mean sudden movement of elevator controls. "Bumps" should not be "fought." A slow depression of nose while passing through adverse currents was all that was necessary.

(14) Most students over-controlled in flight; some were sluggish in control.

In Turning

(15) In first using the rudders a few students had difficulty in getting away from the bob-sled idea of foot-bar action, which is opposite to that in "Dep" control.

(16) Most students began turn by use of too much control, particularly the rudder.

(17) Skidding on a turn was far more common than slipping, particularly when to the left.

(18) Most students, when over-control had precipitated them in a sharp turn, aileroned hastily against the turn, ignoring the rudder, so that machine leveled out laterally in a decided skid. On straightening out the rudder, the turn came to an abrupt ending, before the desired change in direction was achieved.

(19) Nearly all students, because of haste in beginning turn, have, because they found it necessary to correct overcontrol, by controlling against turn, failed to turn as rapidly and smoothly as they would had they began the turn more cautiously.

(20) Many students, instead of depressing nose slightly before turn was begun, and keeping it at the initial degree of depression, did so after turn was started, until nose was below necessary angle. The nose of machine was thus alternately too high and too low.

In Landing

(21) After engine was throttled or died, many students did not assume gliding angle quickly enough. On the other hand, a few jerked controls forward unnecessarily.

(22) Leveling off too late was as common as leveling off too soon, and much more unwise.

(23) More students leveled off too much than too high.

(24) All students, on final contact with water, failed to have controls back enough, a cause of the great majority of imperfection in landing.

NAVAL and MILITARY AERONAUTICS

Experimental 24-Cylinder Liberty Engine Tested

Washington, D. C.—A short test of a 24-cylinder Liberty X-type motor has been conducted at McCook Field. The test engine was built of standard Liberty 12 parts. The changes involved were few, consisting in the main in the use of two regular crank case upper halves, one of which was somewhat altered, and special design connecting rods.

The following table compares the Liberty 12 and the experimental Liberty 24:

Horsepower (normal)—	
Liberty 24	673
Liberty 12	400
Pounds per H.P. (dry)—	
Liberty 24	1.97
Liberty 12	2.11
Gas consumption (pound per H. P. hour)—	
Liberty 24	.55
Liberty 12	.51

The experimental Liberty 24 compares favorably with successful tests of foreign motors of approximately the same power. An engine of this power, if run at the normal speed, would enable the use of a comparatively large slow-speed propeller without gear reduction, thus increasing propeller efficiency.

The following table compares the Liberty 24 and various high-powered foreign motors:

Motor	Vountry of manufacture	Rated horse power	Weight per h. p. (pounds)
De Dion	France	800	2.15
Liberty 24	U. S.	673-738*	1.97
Fiat A-14	Italy	600	2.36
Rolls-Royce "Candor"	England	600	....
Anzani 20	France	600	....
Renault 12-M	France	550	....
Salmson 18-Z	France	500	1.76
Napier "Lion"	England	450	1.86

*Experimental, not rated.

Inactive R. A. M.'s Permitted to Fly in Government Aircraft

Washington, D. C.—The commanding officer at any Air Service station where flying is authorized may permit qualified Reserve Military Aviators, who are in inactive status, to take such flights in Government aircraft as he deems advisable. Cross-country flights will not be made under this authority and no interference with the regular training or the operation of a station will be permitted.

Before exercising the authority given them in preceding paragraph, commanding officers of Air Service stations will be held responsible that the following conditions have been fulfilled:

(a) That individuals applying for such permission have fully and completely identified themselves—documentary evidence being required when necessary.

(b) That such individuals have demonstrated to the Flight Surgeon that their physical condition is satisfactory for solo flights.

(c) That no applicant is permitted to fly solo until he has been reported by a qualified instructor as competent to do so after an actual test in the air.

The foregoing restrictions have been found necessary as a result of the experience gained to date relative to flying engaged in under authority of Orders No. 30, O. D. A. S., 1919, which has been rescinded by this order. Commanding officers are directed to observe the spirit as well as the letter of these instructions to the end that Government property may not be needlessly destroyed nor the lives of over-enthusiastic pilots in poor physical condition, or whose flying efficiency has been lowered by too long an absence from flying, be needlessly endangered.

Flying Permits from Army and Navy Board of Aeronautic Cognizance No Longer Required

Washington, D. C.—The War Department authorizes publication of the following from the office of the Director of Air Service:

The President has revoked his proclamation making it necessary for all civilian fliers to apply for flying permits to the Joint Army and Navy Board of Aeronautic Cognizance. As legislation in connection with internation aerial regulations is pending in Congress concerning the issuance of flying licenses, it is not believed by the Army Air Service Joint Board that it is necessary or practical for municipalities or states to issue flying licenses until a national standard license is authorized.

Souther Field Personnel Ordered to Texas

Americus, Ga.—According to the local press orders have been received at Souther Field for the transfer of 121 enlisted men now stationed here to Ellington Field, Houston, Texas. As there are only 140 officers and men now stationed at the field, this order means the virtual abandonment of the post.

Summary of Status of Army Planes in United States

Washington, D. C.—The Air Service reports a total of 9,204 planes in the United States, 858, or 9 per cent, of which are in commission. The table shows the status of these planes as of August 7. The total does not include planes already delivered to concentration points for delivery to the Curtiss Corporation. The item in reserve includes planes of all types, foreign and domestic, in storage and at depots:

Status	Number.	Per cent. of total.
In reserve	7,369	80
Out of commission	977	11
In commission	858	9
Total	9.204	

3,162 Reserve Officers in Air Service

Washington, D. C.—Of the 15,646 commissioned officers discharged from the air service, 1,638 flying and 1,524 non-flying officers have entered the Reserve, a total of 20 per cent of the number discharged.

Air Service Demobilized 91 Per Cent Since November 11

Washington, D. C.—The Air Service reports a net decrease in strength to August 7 of 91 per cent.

The following table shows the present distribution of personnel as compared with that of November 11. The August 7 figures do not include 505 officers in transit or at demobilization camps awaiting discharge:

	Nov. 11	Aug. 7	% net dec.
Cadets	6,483	3	99.9
Enlisted men	167,986	13,562	92
Officers	20,554	3,426	83
Total	195.023	16.991	91



Participants in the balloon race, the feature of the Fort Omaha Aerial Carnival, from left to right: Lieut. Connolly, Lieut Huffman, Mr. A. Leo Stevens, Lieut.-Col. Jacob W. S. Wuest, Major O'Brien, Lieut. Thompson. Rear row: Capt. McKinley, Lieut. Neely, and Lieut. Jordan

FOREIGN NEWS

Aeroplane Lands on Jungfrau

Berne—Aviation Lieutenant Aikermann, accompanied by Major Isler, effected a landing on the summit of the Jungfrau on August 18.

The point where thier biplane was to have landed was marked by cinders in the snow, but the machine dropped into an air pocket and fell in deep snow 100 yards away from the landing place. The aviators were not hurt.

Perfect Record for Daily Blackpool-Manchester Service

Blackpool, Eng.—The daily passenger service between Manchester and Blackpool has run daily for three months without a forced landing. The fare is £4 4s single and £9 9s return flight. During the last week in July over 1,000 passengers were taken up at the Blackpool Aerodrome.

Farman Enterprise

Paris—The following advertisement appears weekly in the Paris "Daily Mail" for the Farman Company:

"*To the Belgian Victory Fetes by Aeroplane.*

"This week the Goliah will leave for Brussels as usual on Tuesday morning, returning to Paris on Friday morning. Passengers will thus be enabled to witness the splendid fetes that our Belgian allies are holding in celebration of victory.

"Messrs. Farman beg to announce that, besides the regular flights made by the Goliah, they can place at the disposal of business men or tourists a number of aero-taxis for one or two passengers and aero-limousines for parties of at least four passengers at the rate of 2 francs per kilometre and per person, as well as Goliah aerobuses for parties of at least ten passengers at the rate of 1 franc 25 centimes per kilometre and per person.

"It will be seen from the foregoing that the charge for an aeroplane flight is very nearly equal to and sometimes less than the charge for a journey by automobile."

Scotland-Norway Service Planned

Major Galpin, R. A. F., has arrived in Norway to negotiate with the Norsk Luftfartrederei and a British company to establish a passenger service between Scotland and Norway.

School of Military Aeronautics in Brazil

Rio de Janeiro—The French aeronautic mission, headed by Colonel Magnin are inaugurating a school of Military Aviation at Affonsos. Fifteen pilots will act as instructors.

There will be two courses; one for army pilots' license and one for aviation mechanics. Soldiers who qualify will be admitted to the school with the rank of sergeant. The facilities and equipment for instruction purposes at the school are of the best.

Sir Hugh Trenchard Receives Baronetcy

London—In recognition of the great services rendered during the war in connection with Royal Air Force during the war, His Majesty, King George, has conferred a boronetcy upon Air Vice-Marshal Sir H. Trenchard, K. C. B., D. S. O. A bounty of £10,000 has also been recently given Sir Trenchard.



England is ready for civilian aeronautics. Aerodromes are established at every point on the map

Air Force Personnel Slightly Reduced

London—A parliamentary paper recently issued showing the personnel of the staffs of the various Ministries, gives the following figures for the Air Force: November 11, 1918, 4,646; March, 1919, 4,090.

Turin-Rome Record Broken by Sia Machine

The aeroplane record, with passenger, from Turin to Rome, was broken on July 12th by Lieutenant Brack-Papa, flying the Fiat BR biplane equipped with a Fiat 700 h.p. 12-cylinder engine. The distance of 362 miles was covered in 2 hours 15 minutes, this giving an average speed of 161 miles an hour. The previous record with passenger over this route was 2 hours 50 minutes, established by Sergt. Stoppani on a Sia machine.

Sir Herbert Austin Decorated by King Albert

The King of the Belgians has conferred the title of Commandeur de l' Ordre de Leopold II upon Sir Herbert Austin, Managing Director of the Austin Motor Co., Ltd., in recognition of "constant and generous help given to this country in the course of the war."

Airship Control Turned Over to Air Ministry by Admiralty

London—According to announcement made in Parliament by Bonar Law, it has been decided to place the control of airships under the jurisdiction of the Air Ministry instead of the Admiralty.

Conditions of $50,000 "Daily Express" Contest

London.—Now that the Atlantic has been bridged by air in both heavier-than-air and lighter-than-air craft, the next step is to prove the practicability of commercial flying within the Empire.

With this object in view, the *Daily Express* offers a prize of £10,000 not only to prove the feasibility of commercial flying within the Empire, but also to bring the outlyng portions of the Empire into infinitely closer touch with the Mother country.

Australia has offered a similar prize to the first aircraft to fly there from the United Kingdom. There remains, therefore, the task of establishing aerial communication on a commercial basis with South Africa and India. This task the *Daily Express* proposes to carry out.

Conditions

In general, the terms and conditions of the £10,000 competition may be outlined as follows:

(*a*) All types of aircraft are eligible for entry.

(*b*) **The competition is open to all the world, except late enemy countries.**

(*c*) All aircraft entered must carry a useful load of at least a ton both on the outward and homeward flights.

(*d*) Each entrant must produce one aircraft for the flight to and from South Africa, and one aircraft of a similar type for the flight to and from India.

(*e*) The factors considered in the award will be:

Average reliability.
Airworthiness and general conduct of aircraft entered.
Average gain in speed over the established means of transport.

(*f*) As the aim is that each aircraft shall carry a useful load of saleable or exchangeable commodities or raw materials, it will be to the advantage of competitors to study the commercial situation as affecting this interchange.

(*g*) Particulars of entries will be announced within the next few days.

(*h*) Competitors may undertake the flights at any date between the closing of the entries list, which will be announced later, and June 1, 1920. Priority in completion will not prejudice the success of later but obviously more efficient performances.

(*i*) One complete failure by a competitor will involve disqualification for the award.

Further instructions as to the particulars and conditions of the competition will be announced later.

India and South Africa

Peculiar importance is attached to the flight to the East, for these reasons:

(*a*) The vast potential possibilities of India commercially to the Empire.

(*b*) The delay in both sea and cable routes to India, which has been greatly aggravated by the war. This delay will continue for years to come to the detriment of both the United Kingdom and India.

(*c*) The fact that it is now established that the defence of the Indian frontiers in the future will rest chiefly in the air. The establishment of commercial air routes to and from India will have an enormous moral effect throughout the East, and may well eliminate the possibility of hostile incursions such as that recently undertaken by the Amir of Afghanistan.

South Africa also is keenly alive to the great mutual benefits, both material and sentimental, which will accrue from regular aerial transport to and from the Mother country.

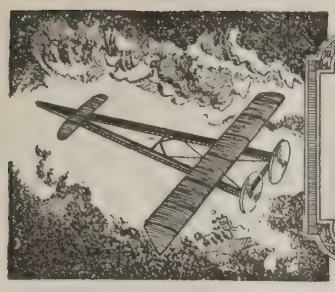
We hope, in due course, to publish details of the entries. At present Messrs. Vickers, of Atlantic fame, are considering the project, and as the "Vimy" appears a machine capable of carrying out the conditions of the competition, it is anticipated that they will enter. The Farman Company have entered one of their "Goliath" machines.

World's Altitude Record with Passenger Again Reported Broken

Paris—A new world's altitude record of 30,000 feet is said to have been established for an aeroplane with passenger on August 13 by Lieut. Weiss, the pilot, and Mechanician Begue, according to the newspaper *Auto*.

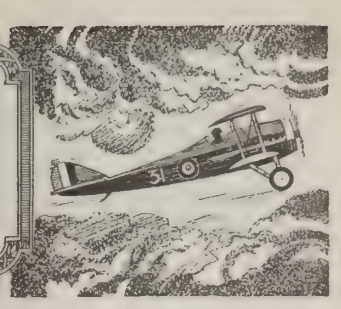
The flight, which took 52 minutes, was made at Villacoublay, near here. The aviators' instruments showed that they experienced a temperature of more than 25 degrees below zero.

The official figures on the ascent will be made public later.



ELEMENTARY AERONAUTICS
and
MODEL NOTES

By John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.

BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn

INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana

BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.

TRIANGLE MODEL AERO CLUB
Baltimore, Md.

NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.

BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.

THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.

SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana

MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.

MODEL AERO CLUB OF OXFORD
Oxford, Pa.

CAPITOL MODEL AERO CLUB
1726 M Street, N. W.
Washington, D. C.

AERO SCIENCE CLUB OF AMERICA
Beach Bldg. E. 23rd St.,
N. Y. City

AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

Illinois Model Aero Club Note

By W. E. Schweitzer

THE Illinois Model Aero Club hand-launch duration contest was held Sunday, August 3, at Ashburn flying field. The weather was very threatening and twice the models were put away to avoid being wet by the passing clouds.

The contest was another of the series for the Laird Weaver trophy which is awarded each year to the club member having the highest average for the season. The cup was first won by W. D. Pease in 1916, next by W. R. Sprague in 1917 and last by W. E. Schweitzer in 1918 and in whose possession it is now.

The best duration of the day was made by W. E. Schweitzer, 133 seconds, W. D. Pease next with 114 seconds and E. C. Cook third with 89 seconds.

The results were as follows:

	Seconds		
J. J. Lucas	55.8	11	8.6
W. D. Pease	1.2	111.2	114
W. E. Schweitzer	105.2	133	129.4
W. Wrixon	5.6	25	22.2
E. C. Cook	89	0	0
H. Wells	26.2	40	22
R. Jaros	37.4	72	6.4

Several others were also out but without models.

A number of large machines were also flying, some with passengers at $25 a hop, but most of them were just out for a spin. Buck Weaver, an old member of the club, left during the afternoon for Cleveland expecting to make Toledo that night and Cleveland the next day.

W. E. Schweitzer made several attempts at the R. O. G. distance record, but the longest flight, 3,034 feet, was 330 feet short.

The next contest for the club will be R. O. G. duration on August 17 followed by another hydro meet on Labor Day, September 1.

The Halford Aero Motor Constructed by Harry Herzog

AFTER reading Mr. McMahon's article on the construction of the Ford aeroplane it encouraged me to see if it was not possible to design a motor within reach of everybody's means.

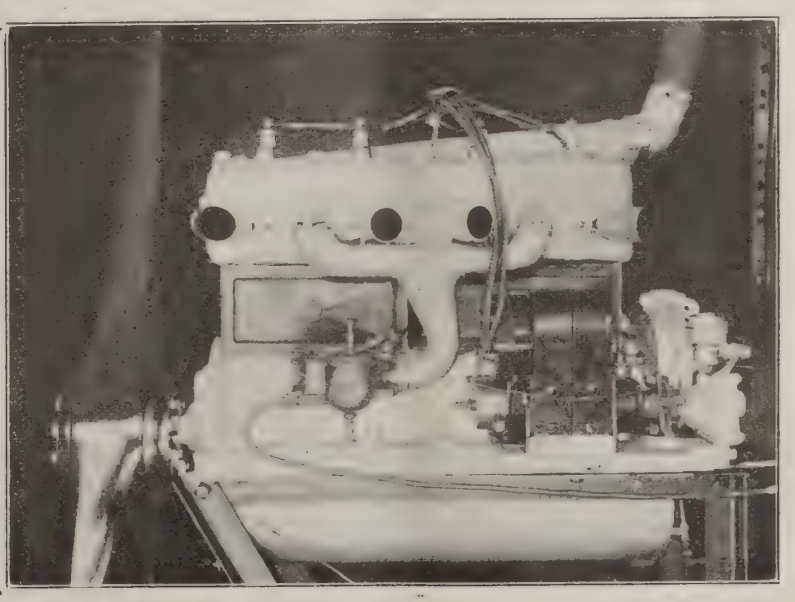
The motor is strictly Ford as to compression valve area and timing; the pistons are aluminum with special rings lapped to perfect fit; the rods are standard type grooved for better oiling; they have a specially constructed dip which is the future of the lubrication of the entire motor; the cooling is thermo-syphon; the crankcase is special and contains one gallon of oil; the carburation is taken care of by a special carburetor for high speed work, and has given perfect results.

The ignition is Bosch magneto. There is an oil gauge for the crankcase level and the crankcase is divided so that it can run at a 25-degree angle without affecting the lubrication.

The propeller is bolted direct to crankshaft so that the crankshaft will not shift or distort itself; the crankshaft is threaded and has an adjustable ball thrust end bearing.

The tests of this motor have been more than satisfactory in results obtained. The motor is wonderfully flexible, and the temperature after two hours' running is all that can be desired for aircraft work.

The speed at one-eighth throttle is 750 R.P.M., and at full throttle, 1,900 R.P.M. The motor shows no vibration at any speed and indicates the even balance of the reciprocating parts. The motor is a guaranteed product and is constructed by the Auto Motor Repair Company, 478 Sterling Place, Brooklyn, N. Y.



The Ford Motor described above which has shown up pretty well in recent tests. This motor has all the original features of the Ford, but is timed and tuned up for the higher speed and extra lead which is called upon to overcome when mounted in an aeroplane



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Sojers

Two Tommies, dishevelled, torn with wounds, and altogether untidy, were on leave in London. As they stood in Trafalgar Square there approached a detachment of the Royal Life Guards in silver trappings, waving plumes, red coats, long varnished boots shining like mirrors, and white leather gauntlets.

The Tommies looked on in silence for a moment and then one nudged his mate.

"Looka, Bill," he whispered in an awed voice, "Them's sojers!"—*New York Globe.*

Modern Curriculum

"Is this a strictly modern school for young women?"

"Judge for yourself."

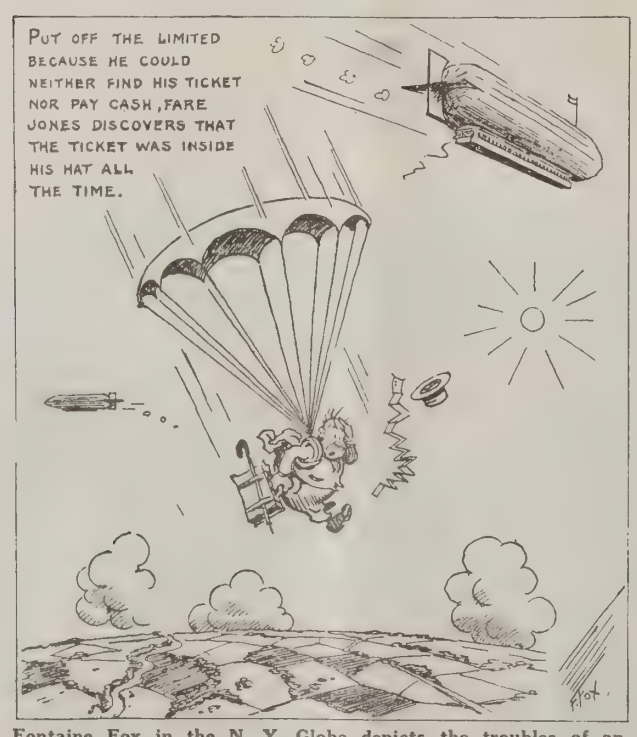
"Well?"

"Dancing, motoring, aviation, and stump-speaking are featured in the curriculum."—*Birmingham Age-Herald.*

No Argument

After a young lawyer had talked nearly five hours to a jury, who felt like lynching him, his opponent, a grizzled old veteran, arose, looked sweetly at the judge, and said:

"Your honor, I will follow the example of my young friend who has just finished, and submit the case without argument."—*Life.*



Fontaine Fox in the N. Y. Globe depicts the troubles of an aerial traveller

Overheard at an Aerial Passenger Booking Office

The booking agent of a well-known passenger air line sends us a few samples of questions asked by prospective passengers:

"If I take my dog with me, do you think he will get sick?"

"Must I take Motherill's seasick remedy before I go up?"

"Can I stop off to see a friend on the way down?"

"If I get killed do you have to go to prison?"

"Are your pilots blonde or brunette? I read an article that only blonde pilots made good overseas."

"What happens if your engine stalls while we are in the air?"

"Will you promise not to fly too high?"

"How often have you been hurt?"

"Supposing I change my mind at the last moment, do I have to pay?"

How to Catch an Aviator

Wilmington, Del., Aug. 20 (Press dispatch)—"I know we'd catch an aviator," laughed Miss May Rupert, as, with her sisters, Misses Anna and Amy, they greeted Lieut. Charles Potter, Army aviator, as he landed on the lawn in front or their place, Rupert Farm, at Sedgley.

A few minutes later two more fliers landed into the girls' net and the sextet were seated on the lawn having tea when Lieut. Floyd A. Wilson, commander of the squadron, dashed up in a motor car an hour later.

"Where have you been?" queried the worried officer. "When I saw you circling over the city and then disappear I thought you had been killed."

The three culprits looked sheepish and then the girls explained. They had heard of the expected arrival of the air photographic expedition from Langley Field, near Washington, and when they were out motoring yesterday and saw Lieut. Wilson, who had come ahead of the others to prepare for their arrival, putting out his landing "T" near Greenville, they conceived the idea of constructing a similar "T" on their own place and catching some aviators.

With bed sheets they fashioned the two arms of the "T" which are used to direct aviators to their landing field, spread the cross on their lawn and awaited results. When Lieut. Pottery, flying in advance, espied the mark he alighted to the Rupert farm. The other two men missed both marks and landed at the country club. Later, learning where their companion had landed, they again "took off" and joined him at the farm.

Bring Your Own to Hendon Drome

"Hendon.—The afternoon of Saturday, July 12, was quite as exciting as usual, perhaps more so, as the Summer Meeting was postponed, and only two passenger-carrying carroty "Avros" disturbed the peaceful sight of the trains going by. It had rained quite unpleasantly in the morning, but cleared up quite nicely in the afternoon. It would have been possible to hold the meeting, as rain does not interfere with determined aviators, but the public would not have been very pleased to sit on the wet forms. It strikes one that perhaps after all these meetings are not held entirely for the amusement of the Grahame-White Aviation Co. Despite the fact that there were only about a dozen visitors, it was necessary to wait nearly half-an-hour to obtain tea."—From *Aeronautics* (London).



The Valentine Crew Valsparring the stern propeller of the R-34

Propellers of R-34 protected with Valspar—

BEFORE starting the homeward trip inspection of the propellers of the British dirigible R-34 showed that the flight to America had badly injured the varnish, leaving the laminated blades in a dangerous condition.

At Major Scott's direction Valspar Varnish was used to refinish the propellers because he knew that Valspar was absolutely waterproof and elastic enough to stand the terrific vibration without cracking.

The photograph shows the Valentine crew at their difficult task of Valsparring the stern propeller while the giant dirigible swung hundreds of feet back and forth across the field.

Hardly an hour after the varnishing was finished the remarkable drying qualities of Valspar were accidentally proven when tons of water ballast were dumped on the forward propeller, and a few moments later the hot engine exhaust beat against it for ten or fifteen minutes. But already the Valspar had set and no harm was done.

In air service as in marine work you can always depend absolutely on Valspar — it is accident-proof.

VALENTINE & COMPANY
456 Fourth Ave., N. Y.
Largest Manufacturers of High-grade Varnishes in the World
Established 1832
New York Chicago VALENTINE'S VARNISHES Boston Toronto
London TRADE MARK Amsterdam
W. P. FULLER & CO., San Francisco and Principal Pacific Coast Cities

done credit to a large factory devoted entirely to the business of building planes. Something of the character of the work done at these depots can be realized when it is stated that it does not consist simply of the minor repair of a broken wing section or a slight defect in engine, but in the majority of cases amounts to the complete overhauling of a motor and the entire rebuilding of the plane.

Routing a Job Through the Shop

To understand adequately the amount of work done on one machine it is necessary to visualize a total wreck as it is unloaded from the railroad car, with hardly a stick of wood or piece of metal apparently in usable condition, and then see the repaired plane a few days later completely rebuilt and newly varnished displaying the Red, White and Blue Bull's-eye of the Air Service on the wings, and ready to take the air for active service again. Not only have the men of this depot repaired almost hopelessly damaged planes and engines, but they have also completely constructed a plane from the ground up, and turned it out in as perfect condition as an aeroplane from any recognized factory. An excellent way to obtain an idea of the repair work done by the aeroplane mechanics is to follow a job through the shop. The main shop buildings are the Aeroplane Assembly and the Engine Repair, two long wooden structures adjoining each other sufficiently closely for effective co-operation. The lumber shed which feeds the Aeroplane Assembly is conveniently located near one end of that building, as is also the Dope House, to which the plane goes for varnishing. Right behind the Engine Repair is the Aero Supply Building, where an enormous stock of aeroplane supplies is always kept on hand, so that it takes but a short step to secure needed materials. The aeroplane wrecks are unloaded on the shipping platform of the Aeroplane Assembly Building, where they find themselves almost immediately in the Dismantling Department, located near the receiving entrance of the building. Here the engine is taken out and sent over to the Engine Repair Building, to go through the various processes of overhauling. This overhauling includes, first, a trip to the washroom, where all the parts are thoroughly cleaned and the carbon scraped off: then follows a rigid inspection to see which parts are to be rejected. Such parts are replaced by new ones, and others susceptible of repair are repaired. Then begins the work of reassembling. When the engine is again completely set up it is swung by chains onto an overhead rail and pushed out to the motor blocks, where it is subjected to a two-hour test, after which it is ready for installation in the plane.

Let us now follow the fuselage in its journey through the Aeroplane Assembly Building. First, the old fabric is stripped off and the wings, landing gear and tail surfaces removed. Each separate part is tagged with the number of the aeroplane from which it was taken, and sent to its proper department, where it undergoes close inspection, and, if defective, is replaced by a new part. The fuselage frame is then set up, carefully examined, and notes made of the repairs needed. Then it moves on a few yards further to the "First Assembly," where the process of repairing begins. Broken longerons are spliced and new straps and fittings put on. In the "Second Assembly" wires and turn-buckles are replaced, and the gas tank, seat rack and engine bed is added. The fuselage is then put on an aligning stand and is trued up, after which it moves on to the "Sub-Assembly," where it receives the instrument board with equipment. The next move finds it in the "Fabric Department," where the covering is put on, after which it is ready for varnishing in the "Dope House." Meanwhile the wheels and landing gear are being repaired or replaced, and when the fuselage has been varnished and lettered it comes out to the "Final Assembly," where it is put on a stand, the engine is "dropped in" and the radiator added. Then the landing gear is affixed, cowl, streamline, center section, empinage and wings follow, and the thing finally stands forth as an aeroplane all complete. A final test of the motor follows, and then if the whole job is found satisfactory the plane is again taken down for packing and crating; or if its destination is some field within the "flying delivery" radius the plane is hauled over to the Speedway motor course on trucks and trailers, tested in flight, and then flown away.



A VIEW IN THE FINAL ASSEMBLY ROOM

This photograph shows planes in all stages of final assembly, from those awaiting the installation of the engine to others, further back in the picture, that are ready for shipment. In this picture can be seen the chains of the overhead shop railroad, made by the Richardson-Wilcox Mfg. Company, Aurora, Ill., and used throughout the shops; for surface transportation a shop truck made by the Automatic Transportation Co. of Buffalo is used

The Future of the Repair Depots

From all this it will be seen that the aviation repair depots have been a vitally necessary and important link in the great chain of air service institutions. Additional depots had been planned and would doubtless now have been in operation had the war continued longer. What the fate will be of the three depots now existing remains to be determined. If the Southern flying fields, where all-year-round flying can be carried on, are to be maintained in peace times, it would seem logical to retain both the Dallas and Montgomery repair depots. In the North, however, the fields are not used in the winter, although some of them could be; and in any case they have been closed since the ending of the war.



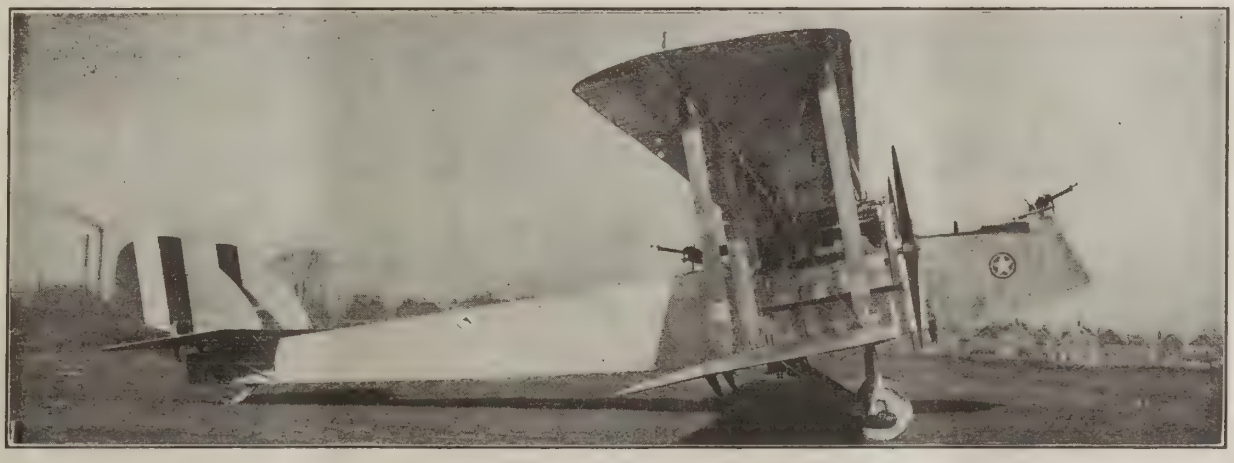
A view of the Welding Room of the Small Parts Department, with the Blacksmith Shop in the background



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Tests on Thin Plywood

(*Continued from page* 1136)

of 1/150-inch veneer was unsatisfactory in tearing resistance. Thicker material, even without cotton fabric, made of veneer such as 1/55-inch basswood or 1/80-inch birch, proved to be much more resistant to tearing than doped linen. The addition of a cloth fabric further increased the tearing resistance.

Rigidity

In order to retain the desired theoretical aerofoil, the covering of an aeroplane wing or tail surface must be rigid; that is, it must stretch comparatively little upon the application of a distributed load, such as the air pressure.

Rigidity was measured at the Laboratory by the magnitude of the load at a given deflection, as determined by the sand-load test shown in Figure 3. The sand is retained by the frame shown in Figure 3, and leveled off on the surface. The deflection at the center of the sheet was measured at each load, and later plotted against the corresponding load in pounds per square foot of surface.

The curves of Figure 4 show what a marked difference in rigidity exists between the doped linen and thin plywood of satisfactory construction. The superiority of the thin plywood over the linen extends over the entire range of loads used (up to 70 pounds per square foot), but is most marked for the lower loads.

Stability

Aeroplane covering which becomes loose or abnormally tight, or develops waves with changing atmospheric humidities is quite unsatisfactory. Such changes in stretch are here described under the term "lack of stability."

Stability determinations were made upon a variety of thin plywood constructions by placing out-of-doors the sheets tacked upon heavy frames, thereby exposing them to changes in humidity. Stability was measured in this test by changes in sag with changing humidity. A small weight was placed upon the center of a test sheet tacked upon the frame and the deflection at the center of the sheet was measured. The panel was then turned over and deflection measurements were again taken. The sum of the two deflections is spoken of as the "sag."

Thin plywood, especially when unprotected, absorbs moisture very rapidly, so that there is an appreciable loosening and tightening with changing atmospheric humidity. The tests showed the necessity of giving the sheets several coats of a good waterproof finish. Such coatings as aluminum leaf, barytes enamel, and spar varnish were tried. Their effectiveness in keeping out moisture was in the order in which they are named.

Numerous tests have shown that for a three-ply construction the shrinkage from the soaked to the oven-dry condition is somewhat greater than 0.5 per cent across the grain of the faces and somewhat less than 0.5 per cent parallel to the grain of the faces.

Thin Spanish cedar plywood covered with two coats of barytes enamel and one coat of spar varnish changed moisture content only about 4 per cent upon exposure to almost 100 per cent relative humidity for a continuous period of four days. Similar material protected with an aluminum leaf coating absorbed less than 1 per cent moisture in the same period. Unprotected plywood is, however, not as stable as doped aeroplane linen.

Conclusions

The tests indicate that while plywood sheets may be made that will compare favorably in weight with doped linen, they cannot be manufactured on a commercial scale in the present state of the plywood industry; and, furthermore, that such very thin sheets are unsatisfactory in toughness, tearing strength and stability.

The most promising material consists of two plies of about 1/55-inch low-density veneer, such as yellow poplar, or 1/80-inch high density veneer, such as birch, glued with the grain of one ply at right angles to the grain of the other ply, and having a sheet of cotton cloth incorporated between the plies. Such material weighs almost 2.5 times as much as doped aeroplane linen and somewhat more than this when coated with various finishes. While the weight of thin plywood of this kind is considerably greater than that of doped linen, its tensile strength is more than three times as great as the tensile strength of linen. It is far more rigid than linen and has greater resistance in tearing. Two-ply wood, however, requires a framework or ribbing to hold it in place to best advantage and to prevent the formation of shallow waves. Therefore, in cases where large surfaces are to be covered without supporting framework, a standard three-ply wood may be more desirable.

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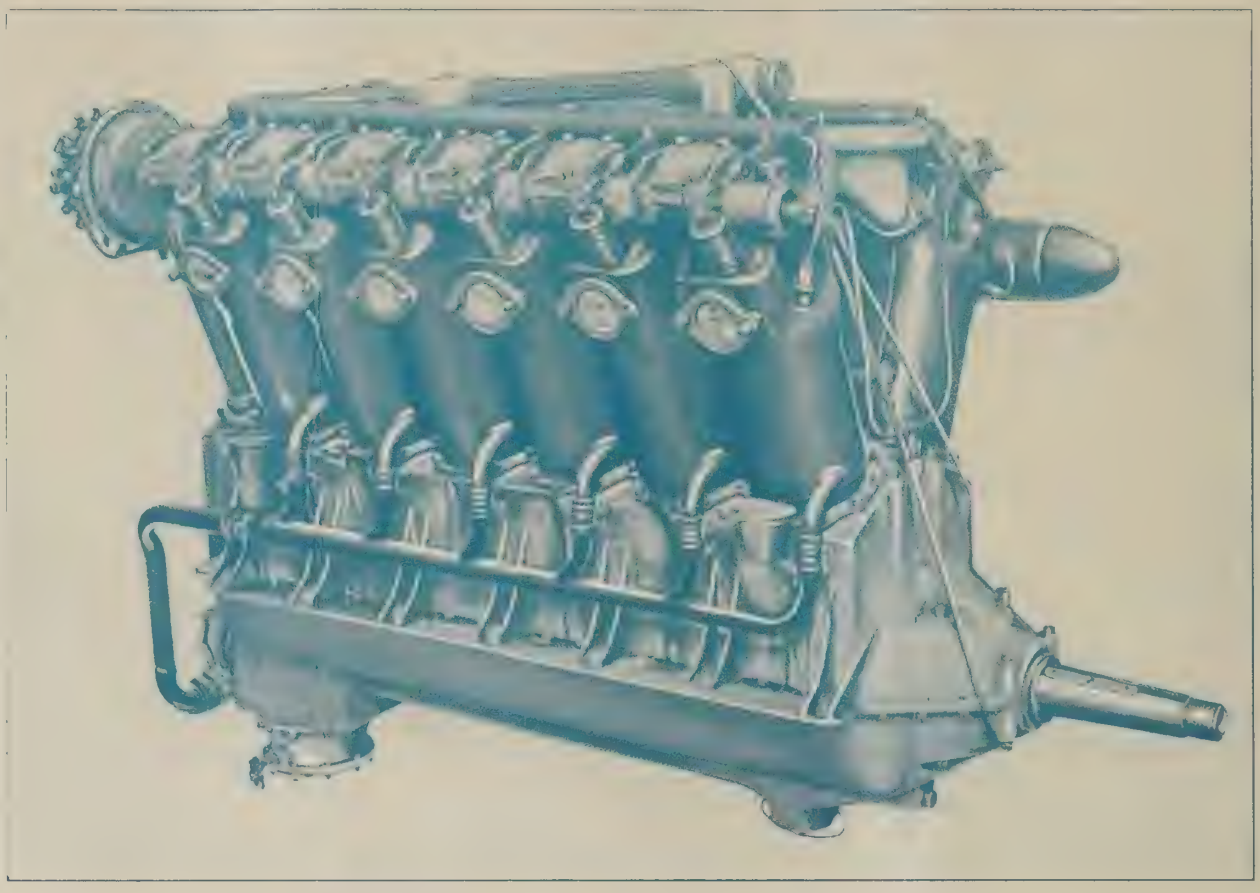
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THE BRITISH AIRCRAFT COMPETITION—WHY NOT AN AMERICAN COMPETITION?

THE complete regulations governing the British aircraft competition have been received by AERIAL AGE in an official communication from the British Air Ministry. The regulations are of special interest, as they establish a basis for developing regulations for technical competitions dealing with different aspects of aeronautic progress. This progressive step of the British Government opens a way for the American Government to do likewise.

The official communication follows:

A committee composed of members of the Air Ministry and of the Aviation Industry has been sitting for the past two months under the chairmanship of the Under-Secretary of State for Air to consider the question of encouraging the future development of aviation on the lines of increased safety. A large number of witnesses has been called, including constructors and designers and representatives of public who are interested in aviation. It has been decided, as stated in Parliament, to institute a competition open to the British Empire. Prizes to the value of £64,000 will be awarded by the Government under the conditions which are set out below:

Rules for a Competition for Aircraft to Further the Attainment of Safety of Air Travel

(a) The aim of these competitions is to obtain a real advance in the efficiency and design of aeroplanes and seaplanes, more especially with the view of increasing the safety of air travel. The rules drawn up are intended to secure this object.

(b) As regards the rules for aeroplanes, it is recognized that the conditions are, generally speaking, easier for the small machine than for the large. The object in this is to attract a large number of competitors from among designers of small machines.

(c) The present competitions are not directly aimed at engine reliability, nor at economy in fuel and oil consumption, although these are of the first importance, but chiefly at the attainment of efficiency in the machine itself. A much longer time is required to produce radical improvements in engines than in machines, and since it is intended that the present competitions should be held early next year, it has been decided to concentrate attention on the machine on this occasion.

Aeroplanes

1. A competition will be held commencing on March 1, 1920, with the object of ascertaining the best types of aeroplanes which will be safe to travel in, and in particular be capable of alighting in and rising from a small space.

2. Two types of aeroplanes will be entered for the competition:

(a) Small type with a total carrying capacity of 2 persons (including pilot).

(b) Large type with seating accommodation for 15 persons (exclusive of crew).

3. Machines and engines must have been designed and constructed within the British Empire. This rule will not, however, apply in the case of such secondary equipment as ignition system, carburetors and instruments.

4. Machines are to fulfil all conditions required for a certificate of airworthiness, and are to carry parachutes for all persons for whom accommodation is provided, including crew.

5. Each machine must be capable of flying level at or above the following speeds with full load at ground level:

Small Type	*Large Type*
100 m.p.m.	90 m.p.h.

And must also be capable of flying level at or below the following speeds with full load at ground level:

Small Type	*Large Type*
40 m.p.h.	45 m.p.h.

Each machine must also be capable of climbing not less than:

Small Type	*Large Type*
500 feet in the first minute, starting from ground level.	350 feet in the first minute, starting from ground level.

6. *Landing and Getting Off Test*

(a) A circle will be marked out on open ground to represent a field surrounded by obstacles. This circle will be of the following diameter:

Small machines.....175 yards
Large machines .....275 yards

The obstacles will be represented by a continuous string or tape with streamers attached, 50 feet from the ground, of such a nature as to be easily broken by an aeroplane.

(b) The landing to be made in still air. Still air includes any wind not exceeding 5 miles per hour at ground level.

(c) During landing the machine is not to side slip nor to turn after reaching the obstacles until it is on the ground. Once it has touched the ground the machine may turn in any direction.

(d) The machine to come to a standstill before reaching the marks representing the boundary of the field.

(e) After landing, the machine to get out of the same field over the 50-foot obstacle in still air (as defined in sub. para. b), no turn to be allowed until clear of the obstacle on the far side.

(f) No braking device operated by the engine may be used during landing.

(g) Any landing or taking off gear used must be integral with the machine.

(h) No landing apparatus may be used that in the opinion of the judges would be liable to cause undue damages to an aerodrome, e. g., a claw attached to the machine as used on certain types of German machines would not be allowed, but the ordinary knife edge on a tail skid would be allowed.

(j) Both landing and taking off to be with full load.

(k) Each machine will be allowed two trial attempts (which are definitely not to be counted as tests), and thereafter will be allowed four attempts, of which two must be successful.

7. *Reliability Test*

(a) In the case of the small type, each machine must carry out a series of two flights of 3½ hours each at a speed through the air of not less than 80 miles per hour, starting with full load. Between flights machines will be left untouched, and under seal if necessary, a period of not more than 30 minutes being allowed before the second flight, for the purpose of filling up and normal examination.

No parts of the machine to be adjusted or changed without permission from the judges.

(b) In the case of the large type, each machine must carry out one flight of 7 hours' duration at a speed through the air of not less than 75 miles per hour, starting with full load. Pilots may be changed during these flights.

8. Machines must be capable of landing from a height of 500 feet, with their engines switched off or completely throttled down.

9. In a machine having two or more engines the stoppage or retardation of any one engine must not prevent the machine from flying level, nor cause it to get out of control.

10. Machines must be capable of being started from the cockpit or cabin without undue muscular exertion on the part of the pilot.

11. Machines to be capable of flying at cruising speed for 5 minutes without the use of any controls or stabilizing devices. Controls may be locked during this test.

12. Machines to be capable of standing unattended and not fastened down in a wind of 10 miles per hour, blowing in any direction with reference to the machine.

13. The design of the machines to be such that the risk of the machine turning over on a rough ground is reduced to a minimum.

14. Each machine to be provided with a complete outfit for pegging it out in the open. This outfit will not be carried as part of the load during tests.

15. In order to be eligible for prizes, machines must fulfil the conditions and tests laid down in Rules 3 to 14, inclusive. Marks will be awarded for soundness and quality of construction, for general features and for exceeding the specified requirements in Rules 5 and 6.

16. "Soundness and quality of construction" will include:

(a) Fire protection, including use of self-sealing tanks, position of tanks, (from the point of view of safety from fire in event of a crash); fire-fighting appliances and accessibility of same.

(b) Reliability of petrol, oil, and water systems, and facilities for seeing if all tanks are full.

(c) Durability of machine, including propeller (any advantages due to metal construction may be taken into account).

(d) Simplicity of design and accessibility of parts.

(e) Absence of vibration in the machine.

17. "General features" will include:

(a) Efficiency and ease of control.

(b) Unrestricted field of view to the front for the pilot.

(c) Silence, as affecting occupants of the machine, including crew.

(d) Comfort generally, including warmth.

(e) Self-starting devices.

(f) Method of wind screening adopted.

(g) Convenience for use of instruments.

(h) Freedom of entry and exit for occupants.

8. With reference to Rule 6, marks will be allotted for the capabilities of machines to land in an area more restricted than that used for the tests.

In judging this, the point vertically below the point where the centre line of the machine crosses the tape will be marked on the ground and the maximum distance reached by the wheels of the undercarriage will be measured in a straight line from this point.

19. Marks will be allotted for exceeding the minimum high speed and for flying less than the maximum low speed.

20. The judges will have regard to the method of fitting parachutes and especially to the means of exit by parachute afforded to the occupants of the large machine and will allot marks for the same.

21. Marks will be allotted for the convenience of pegging out the machine in the open and for the lightness of the apparatus necessary for pegging down.

22. Marks will not be given on account of the number of engines installed.

23. The following will be the allotment of marks:

Soundness and quality of construction (Rule 16).

Sub-para.	(a)	Maximum	8
"	(b)	"	8
"	(c)	"	6
"	(d)	"	6
"	(e)	"	4 Maximum total 32

General Features. (Rule 17).

Sub-para.	(a)	Maximum	6
"	(b)	"	6
"	(c)	"	6
"	(d)	"	5
"	(e)	"	5
"	(f)	"	3
"	(g)	"	3
"	(h)	"	2 Maximum total 36

High Speed. For each m.p.h. in excess of required minimum (Rule 5)	½	No maximum
Low Speed. For each m.p.h. below required maximum (Rule 5)	1	No maximum
Landing. For every complete 3 yards less than the distance allowed in 175 yards for small and 275 yards for large machines (Rules 6 and 18)	1	No maximum

	Max. Marks
Method of fitting parachutes (Rule 20)	5
Convenience of pegging out (Rule 21)	3

Forfeiture of Marks

	Max. Marks
Adjusting or changing parts in reliability test. See Rule 7 (a).	8
For every two minutes or portion of 2 minutes in excess of the maximum time allowed for filling, 1 mark. See Rule 7 (a)	8

24. With reference to Rule 6, when carrying out the landing and getting off test, machines will start with the full load of petrol and oil and will be allowed to fly for 20 minutes. If they have not carried out their tests by the end of that period, they must land and fill up again.

25. The type of propeller used on any machine must be the same for all the tests.

26. Full load is to include: Instruments as under

Revolution counter.
Aneroid.
Air speed indicator.
Turn indicator.
Compass.
Watch.
Oil pressure gauge (when necessary).
Air pressure indicator (when necessary).
Radiator thermometer (when necessary).

Small Type	*Large Type*
Petrol and oil sufficient to fly 450 miles at 3,000 feet. In addition, a load of 440 lbs., to include weight of pilot and passenger, if carried, and parachute.	Petrol and oil sufficient to fly 600 miles at 3,000 feet. In addition, a load of 3,000 lbs., to include weight of passengers, if carried, and also to include parachute, but not to include the weight of crew.

27. Petrol and oil for the tests and as far as possible accommodation (at owner's risk) for the machines will be supplied free by the Government.

28. The judges shall have the right to disqualify any machine that is very seriously defective in any respect.

29. The judges shall have the right to put up a service pilot to fly any of the machines, should they consider it desirable to do so, at Government risk.

All tests will, however, be carried out by the entrant's pilot.

30. During or on completion of any flying test, if it is necessary to effect any repairs to the machine after landing, it will be considered to have failed in that particular test.

This does not apply to cases where the machine is by the judges' instructions being flown by a pilot other than the entrant's pilot.

31. Any entrant may enter more than one type of machine.

32. If a machine is wrecked during the competition, it may, at the discretion of the judges, be replaced by another, but the replacement machine must carry out the whole programme of tests.

33. The decision of the judges shall be final in all matters affecting the competition.

34. The Government does not accept any liability in respect of accidents during the competition, whether resulting in injury to personnel or damage to the machine, except as specified in Rule 29.

35. The Government reserves the right to adjourn the competition.

36. The Government reserves the right to withhold any or all of the prizes if in the opinion of the judges no real advance on existing designs is shown.

37. The Government will, if the entrant agrees, buy the machine of each type winning the first prize, the designs to remain the property of the manufacturers. The maximum prices payable under this head will be:

Small Type	*Large Type*
£4,000	£10,000

38. The following prizes are offered:

Small Type	*Large Type*
1st prize £10,000	£20,000
2nd prize 4,000	8,000
3rd prize 2,000	4,000

39. Entries to close December 31st.

Seaplanes

1. A competition will be held on March 1, 1920, with the object of ascertaining the best types of Float Seaplanes or Boat Seaplanes in which it will be safe to travel, and in particular to be capable of alighting on and arising from land as well as water.

2. Each machine entered for the competition will be provided with seating accommodation for four persons, exclusive of the crew.

3. Machines and engines must have been designed and constructed within the British Empire. This rule will not apply in the case of such secondary equipment as ignition system carburetors and instruments.

4. Machines to fulfil all conditions required for a certificate of airworthiness, and to carry parachutes and lifebelts for all persons for whom accommodation is provided including the crew. The boat or floats must be so sub-divided that if perforated in any one part each float still remains positive buoyancy.

5. Each machine must be capable of flying level at or above a speed of 80 knots with full load at sea level, and must also be capable of flying level at or below a speed of 40 knots with full load at sea level.

Machines must be capable of climbing not less than 350 feet per minute in the first minute.

6. *Alighting and Getting Off Tests.* (a) Getting off test (sea). Machines will be required to take off with full load and clear an obstacle 25 feet above sea level in a distance not exceeding 300 yards from a position of rest.

(b) Alighting test (land.) Machines will be required to land on a smooth aerodrome over an obstacle 25 feet in height and to come to rest in a distance not exceeding 400 yards, measured in a straight line from the point where the obstacle is crossed. For this test machines will be required to carry full load less 50% total and oil.

(c) Getting off test (land). Machines will be required to take off a smooth aerodrome with full load and clear an obstacle 25 feet in height in a distance not exceeding 400 yards from a position of rest.

(d) The above tests are to be made in still air which for the purposes of this competition will be regarded as any wind velocity not exceeding five statue miles per hour.

(e) During landing the machine is not to side-slip nor to turn after reaching the obstacle until it is on the ground. Once it has touched the ground the machine may turn in any direction.

(f) No braking device operated by the engine may be used during landing.

(g) Any landing or taking off gear used must be integral with the machine.

(h) No landing apparatus may be used that in the opinion of the Judges would be liable to cause undue damage to an aerodrome.

(i) In test (a), (b) and (c) above, machines will be allowed four attempts, of which two must be successful.

7. *Test of Reliability in Flight.* (a) Each machine must carry out a flight of five hours at a speed through the air of not less than 70 knots, starting with full load.

Pilots may be changed during this flight.

8. *Mooring Out Tests.* (a) Fair weather. Each machine will be moored to a buoy by its own crew and using its own mooring tackle (other than the buoy and its moorings) for a period of 24 hours during the first 23 hours, of which time it will be left unattended. The crew will not be allowed on board to pump out the bilges at any time during this test except with the permission of the judges in case of emergency.

At the conclusion of the 24 hours period the crew will be allowed on board the machine, will be got under way by its own crew and under its own power and will be required to carry out a short flying test within a period of one hour from the conclusion of the 24 hours period.

The test will be carried out under fair weather conditions. Marks will be allotted for rapidity in getting under way.

Moderate weather. Each machine will be moored to a buoy for a period of not less than 12 hours, unattended under the following conditions:

Locality—Roadstead sheltered from the open sea.

Wind—From 4 to 6 on the Beaufort Scale.

Marks will be allotted for the general condition of the machine at the conclusion of this test, and its behavior during the test.

In both the above tests the ordinary average tidal currents existing round the coast of the British Isles may be experienced.

9. Rough water getting off and alighting test.

Each machine will be required to carry out a test of getting off and alighting on disturbed water, which in the opinion of the judges constitutes a moderate sea. The condition in any case will not exceed State 4 in the sea disturbance scale. (Waves under 4 feet in height).

10. Machines will be required to carry out a test of being towed in a moderate sea as defined in paragraph (9) in a circle of approximately ¼ mile radius.

11. Each machine must make a figure of eight course around two buoys 100 yards apart and within a rectangle measuring 200 yards by 100 yards, in a wind not exceeding 15 m.p.h., the sea to be smooth and the tide at slackwater.

12. Each machine must be capable of moving on the water, under its own power, for a period of at least 30 minutes and at a speed of not less than 10 knots, and not greater than 20 knots.

13. Each machine will be required to carry an anchor and sea anchor, as well as its own mooring tackle and to anchor on good holding ground with its own gear and remain fast in a wind of 10 m.p.h. and with tidal current not exceeding 3 knots.

14. In a machine having two or more engines, the stoppage or retardation of one engine must not cause the machine to get out of control.

15. Machines must be capable of flying at cruising speeds for three minutes without the use of any control or stabilizing devices. Controls may be locked during the test.

16. Machines in the round flying position must take up and maintain a gliding angle, when the engine or engines are cut off without the use of any controls or stabilizing devices.

17. After stalling, (1) machines must be capable of recovering flying speed and complete control without a loss of more than 500 feet of height.

18. Machines must be capable of being started from the cockpit or cabin without undue muscular exertion.

19. (1) In order to be eligible for prizes, machines must fulfill the conditions and carry out the tests laid down in paragraphs 2 to 18 inclusive. Marks will be awarded for soundness and quality of construction, for general features, for general behaviour afloat, and for exceeding the specified requirements in Rules 5 and 8 (a).

20. (2) Soundness and quality of construction will include:

(a) Fire protection, including use of self-sealing tanks, position of tanks (from the point of view of safety from fire in event of a crash), fire-fighting appliances and accessibility of same.

(b) Reliability of petrol, oil and water systems, and facilities for seeing if all tanks are full.

(c) Durability of petrol, oil and

(d) Durability of machine, including propeller (any advantages due to metal construction may be taken into account).

(e) Simplicity of design and accessibility of parts.

(f) Absence of vibration in the machine.

(g) Ease of repair, especially in regard to the hull or floats.

21. (3) General features will include:

(a) Efficiency and ease of control.
(b) Unrestricted field of view to the point for the pilot.
(c) Silence as affecting occupants of the machine.
(d) Comfort generally including warmth.
(e) Self starting devices.
(f) Convenience of mooring and anchoring arrangements.
(g) Method of wind screen adopted.
(h) Convenience for use of instruments.
(i) Freedom of entering and exit for occupants.
(j) Bilge pump arrangements.

22. Behaviour afloat will include:

(a) Stability at rest.
(b) Water stability at all speeds.
(c) Minimum spray at all speeds.

23. Marks will be allotted for exceeding the minimum high speed and flying less than the maximum low speed.

24. The judges will have regard to the method of fitting parachutes and especially to the means of exit by parachute afforded to the occupants and will allot marks for the same.

25. Marks will not be given on account of the number of engines installed.

26. The following will be the allotment of marks:

Soundness and quality of construction (*Rule* 20)

(a) 8
(b) 8
(c) 6
(d) 6
(e) 4
(f) 4. Maximum total 36.

General features (*Rule* 21)

(a) 6
(b) 6
(c) 6
(d) 5
(e) 5
(f) 5
(g) 3
(h) 3

(*Continued on page* 1186)



The News of the Week



Seaplane Tours Planned

Atlantic City.—Extensive seaplane cruises along the Atlantic coast, to take place this fall and winter, were announced recently by Captain Charles J. Glidden, chairman of the Committee on Aerial Tours of the Aerial League of America, who is investigating the facilities for landing seaplanes at different points along the Atlantic coast. Captain Glidden is the donor of the Glidden Aeroplane Efficiency Trophy.

Among the seaplane cruises announced by Captain Glidden will be cruises from Atlantic City to Baltimore, Washington and Norfolk and from Atlantic City to Florida and the Gulf. Other cruises will visit New England ports, while others will follow the Mississippi and other great American rivers. Seaplane cruises from Atlantic City to New York and up the Hudson will be among the first to be organized. Captain Glidden also announced that winter cruises on the Pacific and Gulf Coast will be organized this winter. There are also under consideration Pan-American seaplane tours and cruises, the first of which will be seaplane cruises from Atlantic City along the Atlantic coast to Key West and from Key West to Havana and from there to Hayti and Porto Rico. Other tours of this nature will go from Key West by way of the Isla de Pinos, Great Cayman, Swan Island, Gordo Cays, Quito Sueno and Saint Andrew's.

To discuss these plans a conference was held at the Curtiss Flying Station in Atlantic City recently, at which were present Captain Charles J. Glidden, Mr. Henry Woodhouse, vice-president of the Aerial League of America; Mr. Albert T. Bell, president of the Atlantic City Aero Club; Mr. Earle L. Ovington, president of the Curtiss Flying Station, and Mr. A. S. Abell, 3d.

Army and Navy Balloonists to Compete for Championship Cup

St. Louis, Mo.—The Army and Navy balloon pilots will compete for a silver trophy to be awarded to the military balloon champions of the United States. The race takes place at St. Louis on September 26 under the auspices of the Missouri Aeronautical Reserve, the donors of the cup. Each side will be represented by three balloons and three teams, the personnel of which is to be announced in the near future.

Major A. B. Lambert is in charge of the preparations for the race. Elaborate plans are being made at the camp of the Missouri Aeronautical Reserve. The large number of free balloon pilots which were trained for the dirigible and balloon services of the Army and Navy makes the race of great interest to the men of both services

Maynard Wins New York-Toronto Race

New York, N. Y.—Lieutenant B. W. Maynard, U. S. A., flying a De Haviland Four with a Liberty motor, made the fastest time for the round trip between New York and Toronto in the New York-Toronto Aerial Derby last week. The official results show that his flying time was 465¼ minutes, an average of more than two miles a minute for 1,042 miles. Under a ruling of General Menoher, Lieutenant Maynard is not eligible to the cash prizes offered by Hotel Commodore. These total $10,000.

There were fifty-two entries for the flight and twenty-eight finished the round trip. Three made second starts after failing in first efforts. Excellent flying time, as shown by the summary, were made by many of the contestants despite the poor weather conditions encountered.

The following is the order of finish and the flying time of the contestants in the New York-Toronto Air Race: Lieut. B. W. Maynard, DH-4, 465¼; Lieut. H. H. George, DH-4, 520¾; Lieut. D. B. Gish, DH-4, 524¼; Col. G. C. Brandt, DH-4, 545¼; Lieut. M. J. Plumb, DH-4, 559¾; Lieut. P. H. Logan, Le Pere, 562; Lieut. Ben Adams, DH-4, 564; Lieut. John P. Roullot, DH-4, 570¼; Major R. Schroeder, VE-7, 572; Sergeant C. B. Coombs, DH-9, 576; Col. H. E. Hartney, SE-5A, 589¾; Lieut. R. T. Midkiff, DH-4, 597½; Lieut. Ross Kirkpatrick, DH-4, 602¼; Lieut. C. F. Brown, DH-4, 607¾; Lieut. Charles Colt, SE-5A, 621½; Lieut. F. T. Honsigner, DH-4, 635; Roland Rholfs, Oriole, 667¼; Captain C. W. Cook, Fokker, 759½; Major A. B. Gilkeson, DH-4, 764¼; C. S. Jones, JN-4D, 833½; Lieut. W. R. Taylor, JN-4H, 836½; Captain H. B. Chandler, JN-4H, 895¼; Captain R. H. Depew, JN-4D, 898½; Captain S. S. Moore, Can. JN-4, 912½; Lieut. L. W. Bertrand, Can. Trng., 1285¼; Lieut. Wallace Young, JN-4H, 1313½; Col. Wm. C. Barker, Fokker, 1434½; Lieut. C. A. Schiller, Can. JN-4, 1520¾; Major J. W. Simons, DH-4, 1536¾; and O. S. Parmer, Standard, 3323.

Rochester-New York Flight in Less Than Two Hours

Hempstead, N. Y.—It is announced that the five DeHaviland aeroplanes which constitute the Dallas-Boston squadron flew from Rochester to New York, a distance of 285 miles, in 110 minutes, an average of 156 miles an hour.

Aerial Landing Field at Sunnyside, Washington

Spokane, Wash.—Commercial flying at Sunnyside, Wash., is to be inaugurated by Lieutenant Parshall. A suitable flying field is being prepared.

Lieutenant Parshall will also fly to Lewiston, Idaho, to give exhibitions at the local fair. At Yakima recently Parshall carried the youngest passenger on the coast, Miss Ruth O'Keefe, aged 21 months.

Foreign Trade Convention Urges Establishment of Aerodromes

Chicago, Ill.—At the Sixth National Foreign Trade Convention, recently held at Chicago, a resolution was adopted recommending the establishment of aerodromes at trade centers as an aid in the extension of foreign trade. The text of the resolution follows:

"The Convention suggests to local Chambers of Commerce the advisability of having public aerodromes in all centers that expect to develop large foreign markets in order that prompt delivery of plans and specifications, blueprints and invoices may be made from seaports to the interior. Until such aerodromes are built, local manufacturers will be under the disadvantage of being denied the privilege of speedy receipt of desired documents from great centers of distribution."



The Le Pere biplane, equipped with super-charger, in which Major R. W. Schroeder made the high altitude speed record of 137 miles an hour at 18,400 feet

Low Parachute Jump from Seaplane

New York, N. Y.—Major Orde Lees, late of the Royal Air Force, took a leap from a low-flying seaplane on August 28 near the Statue of Liberty to demonstrate the reliability of the "Guardian Angel" parachute for short drops.

The experiment was being undertaken to secure scientific data and photographs of the exact manner in which the parachute performs when dropped with a man from a fast moving aeroplane. It is hoped that the result will show that an aviator escaping from his burning or crippled machine need have no fear of being drowned or of being enveloped in his parachute should he happen to fall in the water.

The aeroplane from which the jump was made is a three-passenger Curtiss flying-boat, piloted by Lieut. McCulloch, who piloted the NC-3 in the trans-Atlantic flight. Major Lees holds the low altitude record, made when he dropped from London Bridge, a height of 153 feet.

American Escadrille in Polish Army to Fight Bolsheviki

Paris.—An American aviation squadron is being formed in Paris on the lines of the Lafayette Escadrille to fight with the Poles against the Bolsheviki. Major M. C. Fauntleroy, of Chicago, and Capt. M. C. Cooper, of Jacksonville, Fla., have received authority from Gen. Rosvedowski, head of the Polish Military Mission, to form a squadron of aviators who, like themselves, have seen service in war aviation.

Among the men already enrolled are Lieut. Edward J. Corsi, of Brooklyn; Lieut. George M. Crawford, of Wilmington, Del.; Lieut. Kenneth Shrewsbury, of Huntington, W. Va., and Lieut. Carl H. Clark, of Tulsa, Okla. The squadron will be designated the Kosciusko Squadron, after the Polish national hero and Washington's aide-de-camp.

This American squadron is expected to go to Poland September 15. Its members will hold the rank they held in the American Army, but the corresponding Polish pay being less, the men are making a sacrifice. No term of service is fixed, but the aviators will not be called upon to serve more than a year.

Curtiss Company Plans New Air Routes

Buffalo, N. Y.—The Curtiss Aeroplane and Motor Corporation is to establish several new air passenger routes. The planes will be manned by aviators who served in the war and will be specially suited to passenger traffic.

The cities on the routes are to be Rochester, Syracuse, Utica, Albany and New York on one, Erie and Pittsburgh on another, and Hamilton and Toronto on a Canadian route. The route across New York State probably will be opened this fall and the Pennsylvania and Canadian routes next spring.

Planes Fly in Formation under New York's Bridges

Mineola, L. I.—Attempting a new feat, three aviators flew under the five suspension bridges over the East River. The planes flew in triangular formation, starting from Hazelhurst Field at 1:30 P. M., and returning at 2:35 P. M., on August 28.

Lieutenant A. S. Roberts headed the three planes, with Lieutenant C. H. Burgess, who was recently the bridegroom in an aeroplane wedding at Sheepshead Bay, on his right, and Lieutenant N. L. Elliott on his left.



W. G. Ranels who is representing the interests of the British & Colonial Aeroplane Co., manufacturers of Bristol aeroplanes, in America

British Air Attaché Seeks R.A.F. Officers Who Have Not Received Their Decorations

Washington, D. C.—The British Air Attaché, Air Commodore L. E. O. Charlton, D.S.O., has issued a notice for the attention of all Royal Air Force officers and other ranks, now resident in the United States or its overseas possessions, who have been awarded the Distinguished Flying Cross or the Air Force Cross, and who are not yet in possession of the same, should communicate, without delay, to him at the British Embassy, Washington, D. C., in order that arrangements may be made for the due presentation of the decorations.

The above also applies to officers late of the Aviation Service (Army or Navy) of the United States, who are similarly entitled, but who are demobilized, therefore not necessarily in communication with the authorities in this matter.

Around U. S. Flight Resumed

Washington, D. C.—The War Department authorizes publication of the following statement from the Director of the Air Service:

"After a delay at Plattsburg, N. Y., due to necessary repairs, Colonel R. S. Hartz, of the Army Air Service, has again taken the air in a Martin Bomber on his trip around the United States. With Lieutenants E. E. Harmon and L. A. Smith, and a mechanic, he flew from Plattsburg to Buffalo on August 30, a distance of 326 miles, in five hours, with one stop for gas. He expects to leave this morning, August 31, for Cleveland."

Four Year Old Aviatrix Demands Loops

New York, N. Y.—Miss Virginia Marie Waibel, four-year-old daughter of Mrs. John J. Waibel, of Brooklyn, N. Y., not satisfied with straight away flights, is demanding loops and other stunts on her flights. She is a regular passenger at Dana C. De Hart's Aerodrome, Hillside Avenue, Queens. Recently she took a 23-mile flight at an altitude of 2,100 feet. Her mother accompanied her and Dana C. De Hart piloted the plane.

Fast Flight from Buffalo to New York

J. D. Hill, a pilot aviator, of Buffalo, arrived at Mineola, L. I., on August 22 in a Curtiss Oriole machine, after flying from Buffalo, a distance of 440 miles, in four hours and ten minutes. The time established a record for this trip.

1,000 Miles of Aerial Honeymoon Completed

Spokane, Wash.—Finishing the first 1,000 miles of a 5,000 mile honeymoon tour, Lieutenant Floyd Kelso and bride, of Kennewick, Wash., arrived in Spokane, the last lap being from Coulee City, Wash., which was covered at a mile-a-minute flight. The bride of a week is enjoying her novel experience immensely.

Kelso is flying a Curtiss machine purchased from the United States aviation department. Next summer he plans to purchase a three-seater 'plane with a limousine body and to fly from Buffalo, N. Y., to Seattle. Meantime the happy pair will continue their daily flights in the Pacific Northwest until the cold weather drives them to terra firma.



Lieutenant Floyd Kelso and his bride landing at Spokane, Wash., after completing 1,000 miles of their 5,000 mile aerial honeymoon

The AIRCRAFT TRADE REVIEW

W. A. Bishop Heads Interallied Aircraft Corporation

New York, N. Y.—The Interallied Aircraft Corporation recently received its incorporation papers under the laws of the State of New York, to sell and manufacture foreign and domestic aeroplanes, seaplanes, motors and accessories. It is already in a position to deliver twenty-five Curtiss training, in excellent condition and with full equipment.

W. A. Bishop, the Canadian ace of aces, is president of the company; Reed G. Landis, second ranking American ace, and W. G. Barker, R.A.F., vice-presidents; J. W. M. Richardson, treasurer; W. R. Lott, secretary; Chas. H. Payne and C. S. Macdonald, general and assistant managers, respectively. Offices have been established at 185 Madison Avenue, New York.

William G. Ranels Represents Bristol Here

New York, N. Y.—Mr. William G. Ranels has recently opened an office at 512 Fifth Avenue, and represents in the United States the interests of the British & Colonial Aeroplane Co., Ltd., Bristol, England.

Mr. Ranels was sent abroad by the War Department early in June, 1917, in connection with aviation matters and during two years was located in London as an Aviation Technical Representative of the U. S. Air Service.

The British & Colonial Aeroplane Co., Ltd., was established February, 1910, at a time when the importance of the future open to aircraft was scarcely realized. Remarkable progress has been made since the foundation of the company and it now maintains an enviable position in the industry.

The directors of the company have secured the services of the highest authorities in theory and best practical exponents of aviation, the sole object being to produce the most reliable types of machines and to organize methods by which every improvement and research development could be immediately embodied.

Within twelve months of the formation of the company, "Bristol" aeroplanes were flying in England, India, Australia, South Africa, Italy, Russia, Roumania and Spain—the remarkable record in the progress of the new industry.

At the beginning of the war approximately 80 per cent of the British service pilots had been trained at the "Bristol" schools from date of establishment, March, 1910.

At the opening of the war several types of "Bristol" machines were utilized by the government. During the period of the war many successful types of machines were developed, practically all of which were adopted by the British Government and put into production for service.

Consistent with the policy of the company, now that hostilities have ceased, plans have been prepared for the rapid development of types of machines suitable for commercial and sporting purposes. The work of developing planes suitable for military purposes will also be continued.

Capt. F. S. Barnwell, chief designer, who has been with the company for a number of years, will continue on the lines of progressive design. The unlimited facilities for manufacture of all types of aeroplanes will be fully maintained to meet the demand for machines for pleasure, commercial and defense purposes.

Spokane Aviation Companies in Merger

Spokane, Wash.—A merger of local aviation interests has taken place, and the Northwest Aircraft Corporation emerges as the successor to the Northwest Aircraft Company and the Western Aircraft Corporation. Foster Russell, consulting engineer and aviator, will be the manager of the consolidated concern. Thomas W. Symons, Jr., late of the army, will also be identified with the concern. He is an instructor.

Mr. Symons, who will be in charge of all flying, is reputed one of the most skilled pilots in the northwest. His experience includes training at the flying instructors' school at Brooks field and seven months as flying instructor at Call field and Souther field. At Souther field Symons, after being instructor in all stages of flying, including acrobatics, was made flight commander and late officer in charge of flying.

Foster Russell had experience at eight different fields, was picked for a pursuit pilot and is experienced in the flying of the fast Thomas Morse scout planes which were equipped with Gnome rotary motors. He now holds a commission as lieutenant in the air service reserve on flying status.

B. L. D. Company to Manufacture Small Aeroplanes

The B. L. D. Aeroplane Company, Inc., whose flying field is located at Springfield, L. I., on the Merrick Road, are very active carrying passengers every fair day.

The field is located within New York City limits and is about ten minutes from Jamaica.

Two machines equipped with Hall-Scott motors are in constant use. William Diehl, a civilian army instructor and an old pilot, and Howard W. French, who is one of the first 100 R. M. A.'s with 1,000 flying hours' experience, are the pilots.

Mr. R. Brodell has been active in aeronautical circles for some time and is now working on the designs of light aeroplanes to be manufactured in quantities.



The Morane biplane equipped with French Bugatti engine

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
J. B. Corridon, Superintendent, Division of Aerial Mail Service
Louis T. Bussler, Chief of Maintenance and Equipment

J. Clark Edgerton, Chief of Flying Operations
George L. Conner, Chief Clerk, Division of Aerial Mail Service
Eugene J. Scanlon, Chief of Supplies
Charles N. Kight, Special Representative



PILOTS

Dana C. DeHart
Edward V. Gardner
Eber H. Lee
John M. Miller
Leon D. Smith
Max Miller
Charles E. Bradley
Lester F. Bishop
Harold T. Lewis
Leslie E. Stancill
Charles Hugh Anglin
John H. Skoning
Earl F. White
Charles W. Lamborn
Frank H. Crozier
Walter H. Stevens

Charles I. Stanton, Superintendent, Eastern Division
John A. Jordan, Superintendent, Western Division
Harry W. Powers, Manager, Belmont Park
Lowell S. Harding, Manager, Bustleton
Eugene W. Majors, Manager, College Park
W. J. McCandlass, Manager, Cleveland
Ralph D. Barr, Manager, Bryan
O. J. Sproul, Manager, Chicago

Poor Weather Conditions On New York-Bellefonte Lap

Washington, D. C.—Flying across the mountains from New York to Bellefonte, Pa., has proven to be the most difficult route of the Air Mail Service. This is in part due to the fact that the valleys and cities are blotted out by the early morning ground fogs, leaving only the tops of the ridges exposed as landmarks to aviators. It is also due in part to the changeable velocity and direction of the winds over the 215 miles trip from Belmont Field on Long Island to Bellefonte in the heart of the mountains, due to the variety of topographical changes in the way of valleys and mountains. Also the greatest wind velocities are found during the summer time in that region. This is shown in the variations of speed of the fast planes of the Air Mail Service.

Out of 101 trips, 39 were made at speeds ranging from 101 to 132 miles per hour, and 39 trips were made at speeds between 81 and 100 miles per hour. There were only four trips in a period of nearly two months in which the wind was strong enough to hold the speed down to less than 60 miles an hour.

The following is an analysis according to speed of the 101 runs.

	Stevens	Lewis	Anglin	Logg	Total
Between 50 and 60m.p.h	2	2	0	0	4
" 61 and 70 "	4	0	3	2	9
" 71 and 80 "	4	4	0	2	10
" 81 and 90 "	1	5	9	6	21
" 91 and 100 "	2	8	3	5	18
" 101 and 110 "	5	5	7	3	20
" 111 and 120 "	4	2	0	3	9
" 121 and 132 "	6	0	1	3	10
Totals	28	26	23	24	
Grand total					101

Detroit Selects Landing Field

Detroit, Mich.—After an exhaustive study of available sites, the City Planning and Improvement Commission, of which T. Glenn Phillips is director, has recommended the development of a 320-acre plat on Plymouth road, eight miles out of the city, as an aviation field.

Several months ago the City Plan and Improvement Commission was instructed by the Council to select prospective sites for a permanent municipal field after Morrow Field was excluded from the possibilities. The commission has several sites under consideration but has chosen the Plymouth road tract as the most desirable and practical for Detroit's use.

Following the decision that this field was most adapted to the city's needs, a committee of aviators was invited to inspect the field by the commission.

The party consisted of Mr. Phillips, Col. Sidney D. Waldon, Street Railway Commissioner and formerly a member of the United States Aviation Board at Washington; Col. Vincent of the Packard Motor Car Co., who is developing a 100-acre tract for the company as an aviation field; Mason Rumney, William E. Metzger, former president of the Detroit Automobile Club, and Lieut. H. D. Copland, former army aviator, and other aviation enthusiasts.

The tract measures one and one-half by one-half miles and lies in an east-and-west direction, and this direction is best adapted to local conditions where west winds prevail.

The new Pennsylvania Railroad route crosses one end of the tract and the Pere Marquette another, making convenient delivery of provisions, equipment, gasoline and other aeroplane necessities a point in its favor. Except for a gradual slope eastward, the field is comparatively flat.

The site can be purchased by the city at a condemnation price of $200,000.

American Express Company's London-Paris Aerial Express and Passenger Service

London.—The American Express Company virtually has completed arrangements through its tourist department for daily air passenger and baggage service between London and Paris, according to a cable dispatch received by the New York *Sun*. "Our plan," said William Gourlay, the company's manager for the United Kingdom, "is to have facilities available whereby a man or woman can leave London in the morning, fly to Paris and transact business there, and return to London in time for dinner, and vice versa. The arrangements are in the final stages now with the British and French Governments. We expect that customs officials will be posted at each end of the aeroplane route for the specific purpose of checking the baggage of arriving tourists.

"The ship will be installed and operating during October. There will be two grades of travel, both first class, one in an aeroplane carrying one or two passengers and costing approximately $100 for a flight one way and the other in a large air bus carrying fifteen passengers, for which the fare will be about $60 a person.

"We shall start with the air bus leaving three times a week and the aeroplanes daily.

"Automobiles will convey passengers from their hotels to and from the aerodromes, located respectively on the outskirts of London and Paris. The tickets issued will be after the style of steamships with a clause by which the passengers assume the risk for the journey. Each passenger will be allowed to carry a single piece of baggage, preferably no larger than a suitcase. Those going by airbus can travel in their ordinary civilian clothes, while passengers for the faster going aeroplanes will be supplied with headmasks and goggles.

"The minimum time for the journey will be three hours, while four hours will be the maximum period in the air. The present time by train and boat between London and Paris is nine hours and costs about $20."

Mr. Gourlay was asked if other air routes had been blocked out for regular passenger services. He replied: "Yes, before the year is out we shall have aeroplanes meeting all arriving passenger ships at Liverpool and Southampton.



Aerial Mail being landed at Woodland Hills Aviation Field, Cleveland, Ohio

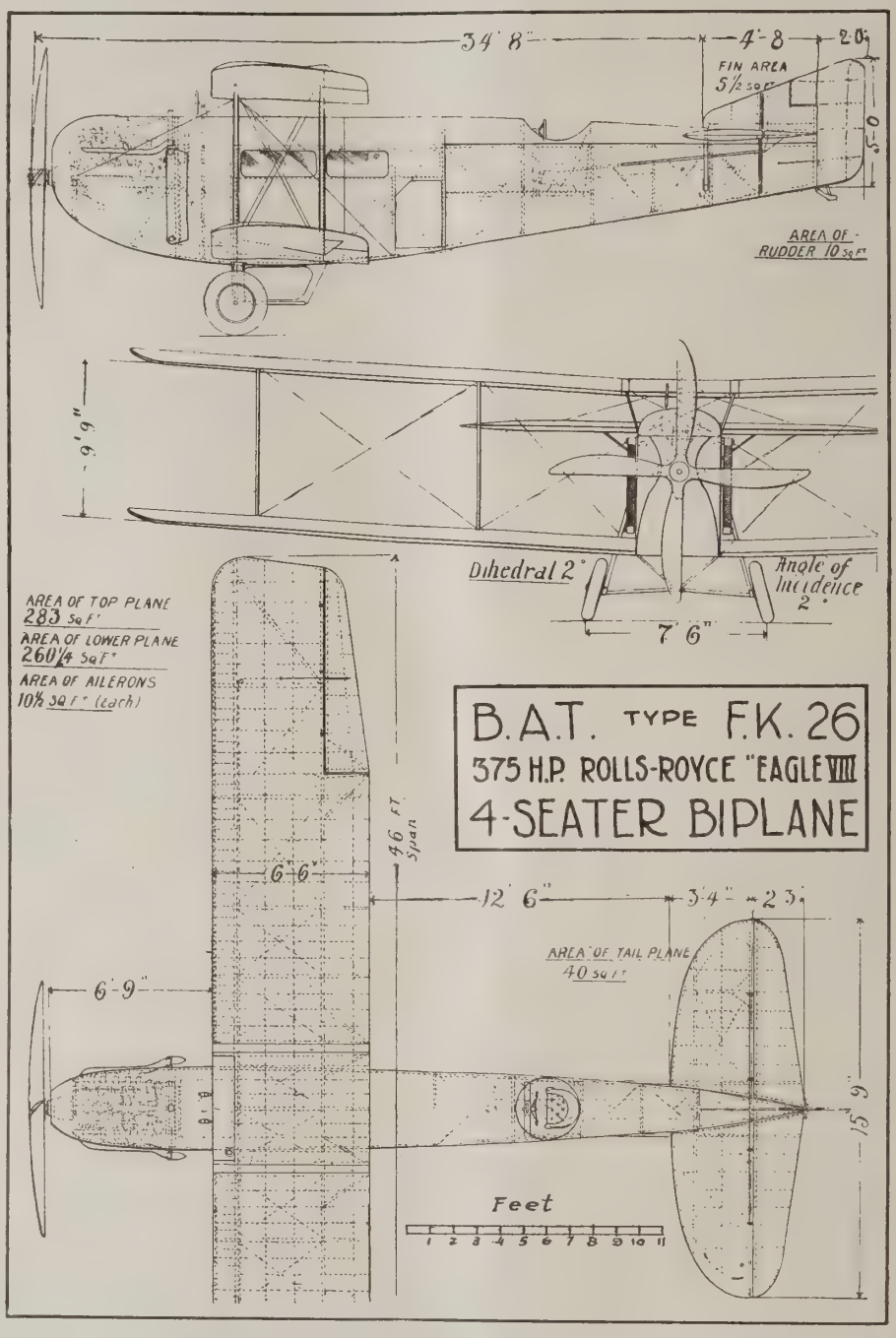
THE B. A. T. FOUR-SEATER BIPLANE

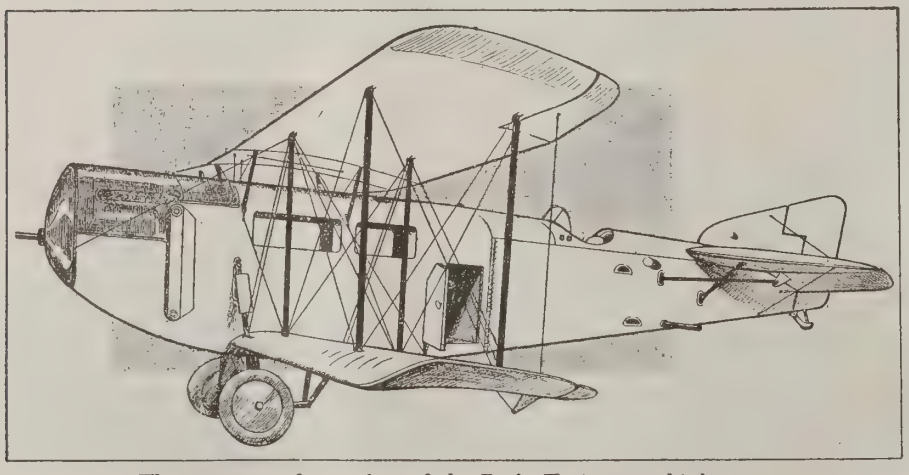
ONE of the first, if not *the* first, post-War "commercial" aeroplanes has just been completed by the British Aerial Transport Co., Ltd., at their works at Willesden. By post-War commercial aeroplane is meant a machine designed since the Armistice, specially for commercial work—either passenger, mail or goods—and *not* a war machine converted for this purpose. In this particular case, the B.A.T. F.K. 26, described in *Flight* has been designed either for passenger work or for carrying mails, there being accommodation for four passengers, besides the pilot in the former case, whilst for the latter purpose it is merely a question of adapting the passenger cabin to meet the requirements for this kind of work. The machine is original in many respects, but is at the same time of absolutely straightforward design, free from "cranky" features.

F.K. 26 is a single-engine tractor biplane, and as may be seen from the accompanying scale drawings, the general lay-out of the "weight items" is efficient and well thought out. The position of the pilot, well aft in the main planes, is such that it enables him to have an excellent view in all directions.

The fuselage, which is 30 ft. 10 in. in length, is of rectangular section, very deep near the wings and tapering to a vertical knife-edge at the rear. Two different forms of construction are employed in the fuselage, the front half, from the nose to the end of the passenger cabin, being built up of three-ply and formers in a similar manner to that obtaining in the German Albatross machines, whilst the rear half is of the conventional girder construction. Both systems, however, have many interesting features. There are four main longerons, of about 1½ by 1¼ in. L-section (solid where necessary), running from end to end, and one additional longeron of similar section in the front half situated between the upper and lower longerons on each side, level with the line of thrust. These longerons are of ash in front and spruce in rear portions. In all there are five transverse formers in the front half of the fuselage, built up mainly of H-section members reinforced by three-ply, and varying in shape and structure as shown in one of the accompany diagrams. There are also diagonal H-section struts between each former, on the sides of the fuselage, and an outer covering of three-ply tacked to the formers and struts completes the construction. There is no wire bracing whatever in this portion of the fuselage. The first and second formers carry the strong ash engine bearers, the third and fourth are placed in line with the front and rear wing spars respectively—the fourth former being in the centre of the passenger's cabin is, therefore, left open, *i.e.*, it has no cross members except at the top and bottom. The fifth former serves as the end wall of the cabin, and between this and the fourth former is what might be termed a false former of light construction. The engine and fuel compartments have a single outer covering of three-ply, whilst the cabin portion has a double (inner and outer) covering. Three separate compartments or bulkheads are thus formed, the first being the "engine room," the second housing the large fuel tanks (six hours), and the third the passenger's cabin.

The latter is exceptionally roomy, measuring roughly 3 ft. in width, 8 ft. in





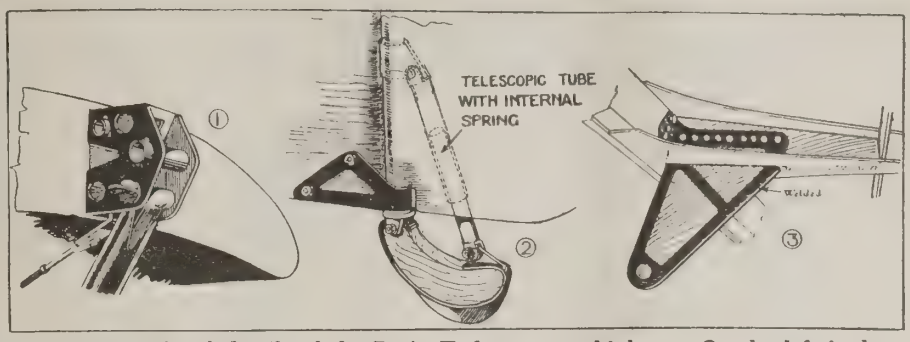
Three-quarter front view of the B. A. T. 4-seater biplane

length, and just over 5 ft. in height. For passenger work, therefore, it affords great possibilities in the way of a luxuriously fitted-up and comfortable "saloon," with armchairs, tables, etc., in the present model there will be three armchairs and one folding seat, the latter, being opposite the door, which is at the rear of the cabin on the port side. Windows, with sliding Triplex glass, are cut in the sides of the cabin between the top and middle longerons, three on the starboard, and two on the port sides, whilst portholes will also be let into the turtle-deck roof at various points.

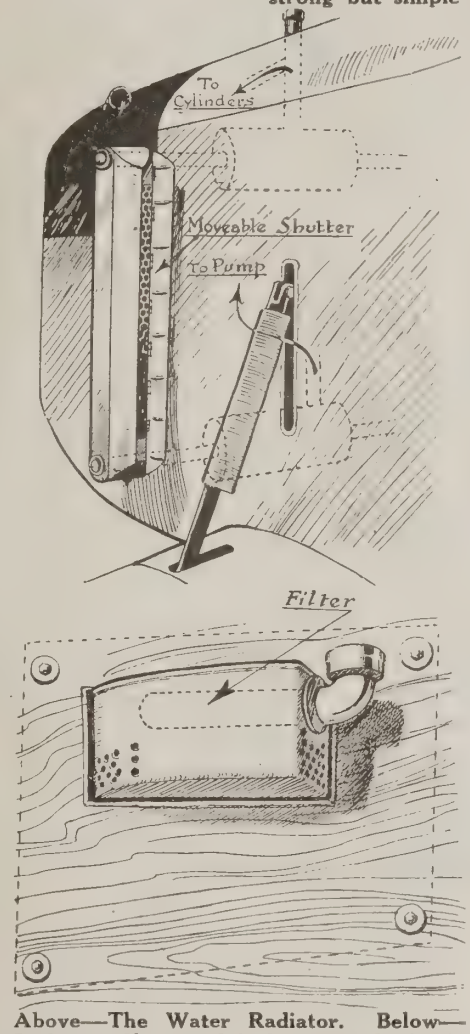
The cabin is equally suitable for mail work, and one can easily visualize this roomy compartment fitted up with pigeon-holes and benches, with a P.O. clerk busy at work sorting out letters, depositing them in their respective parachute bags, and dropping them overboard above their destination!

Aft of the cabin the fuselage is a girder of six bays, the first set of cross members being built up on the lines of the formers in the front half, as shown by No. 6 in the accompanying diagram. The other cross members are of the usual H-section, reinforced here and there by three-ply. With the exception of the last one, all the bays are braced with flat "streamline" steel cable; the last bay, however, has H-section diagonal struts and a three-ply covering. The pilot and control are located in the second bay, being supported fairly high up in the fuselage by two channel-section bearers on a three-ply floor. This rear portion of the fuselage is covered with fabric, except for the top, which has a three-ply turtle-deck. At the end of the third bay a steel tube passes across the fuselage through the lower ends of the vertical struts and projects a few inches on either side of the fuselage, thus providing a means for lifting the tail.

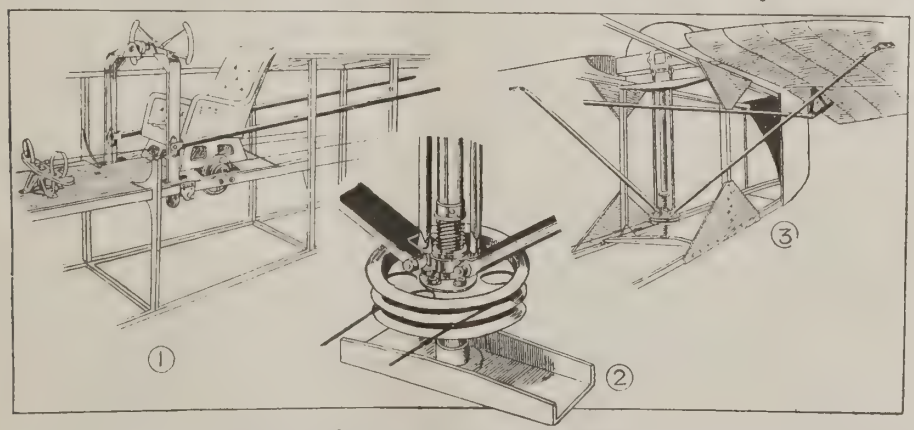
The control is similar to the well-known "Dep." type, and consists of a wooden bridge pivoted to the previously mentioned bearers, carrying at its upper end the peculiar shaped "wheel" shown in one of the accompanying sketches. The elevators are operated positively by flat elliptical-section steel tubes, anchored at the forward ends to each side member of the bridge and connected at the rear to a strong single crank arm on the underside of each elevator flap. The aileron cables are led from the "wheel" over pulleys down the arms of the bridge to its base, whence they pass down to pulleys at the end of the cabin, just below the floor, under which they proceed to pulleys at a point just behind the front spar, where they are taken at right angles out of the fuselage through the lower plane to pulleys just beyond the outer interplane



Some constructional details of the B. A. T. four-seater biplane. On the left is the top plane attachment to the center section which is similar to those on the lower plane. In the center is a sketch of the steerable tail skid, and on the right is the strong but simple elevator crank



Above—The Water Radiator. Below—Radiator, filter, and fuel cap on the B. A. T. four seater biplane



The B. A. T. four-seater biplane—On the left, a sketch of the pilot's seat and control. On the right, the tail plane trimming gear, and inset, a detail of the screw gear of the latter

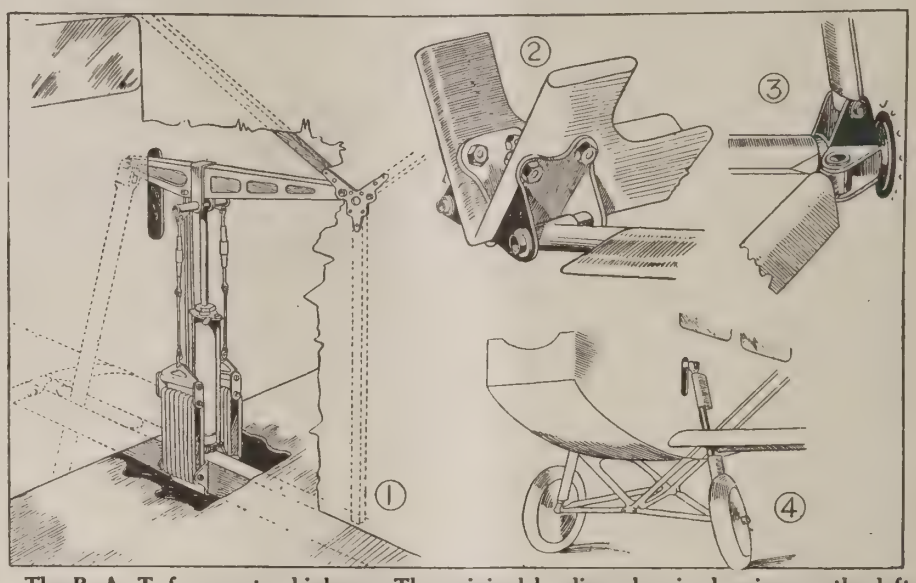
struts. For here they pass out underneath the plane to cranks on the underside of the ailerons. The upper and lower ailerons are connected by steel cables, and the upper port and starboard ailerons are connected by a balance cable passing along inside the top plane. The rudder is operated direct by cables from a wooden foot-bar reinforced by sheet aluminum. Except for the aileron and rudder cables, all other control connections (engine, etc.), are steel or aluminum tubing—all shafts of cranks being mounted in ball bearings. The engine control rods (aluminuium) pass out from the cockpit through the turtle-deck and pass along on top of the latter to the "engine room." The switches are mounted outside the cockpit on the port side of the turtle-deck.

The angle of incidence of the tail plane can be adjusted whilst in flight by means of an aluminium wheel, at the pilot's left just below the seat, which operates through cables a screw and nut gear as shown in one of the accompanying sketches. The rear spar of the tail plan is hinged, so that the front of the tail is raised or lowered.

The main planes are of equal span, and are made of four interchangeable sections and a centre section to which the upper planes are attached. The centre section is mounted on two pairs of steel struts sloping outwards from formers three and four. Each pair of struts is laterally cross-braced by flat, oval section steel wires. A steel strip also connects the lower ends of the port and starboard struts and takes some of the load from the landing wires, which are taken from the base of the centre section struts to the lower plane. The lower plane is attached to short centre sections projecting from the sides of the fuselage, giving the same overall width as the top centre section. The centre section spars pass through the fuselage and are built integral with the respective former. In the front one the ends are cut short for the passage of the chassis strut, which passes through a welded steel box which replaces the cut-away portion of the spar. The end of this box also forms the wing attachchent fitting which is the same on all spars, and which is shown in one of the illustrations. Constructionally, the planes present nothing unusual, except perhaps in the tips. They have what might be described as a lateral washout, that is, the under surface curves up to meet the top surface which is level right to the tip. The spars of laminated I-section, solid where necessary, and the ribs are built up as usual of spruce webs and flanges. Each wing has four bays, the compression members being of the box type, and located at the interplane struts with a third in between. The internal bracing is of piano wire, the outer bay having a diagonal strut. Top and bottom planes are sepa-

rated by two pairs of tubular steel struts aside, and the whole of the external bracing is by streamline wire. Ailerons are fitted to both top and bottom planes, and these taper from root to tip.

The tail plane is of high aspect ratio, and has a symmetrical streamline section. It is built in one piece and mounted just above the top longerons. The rudder is balanced, the vertical fin being cut away to receive the balanced portion. By far and away the most interesting feature of the F.K. 26 is the landing chassis and its shock-absorbing arrangement. As may be seen from our illustrations, the wheels are each hinged by two stub axles to a cabane, consisting of a pair of V struts connected by a longitudinal member, mounted on the bottom of the fuselage. The front pair of these stub axles lies at right angles to longitudinal axis of the machine, and the other pair is inclined back to the rear V of the cabane. Extending upwards from each outer extremity of these "axle-Vee" is a steel tube which is connected at its upper extremity to the end of a lever projecting through the sides of the fuselage and hinged at its other end to the centre of the fuselage-former. Near the outer extremity of this lever is a lug from which connection is made to an oleo shock-absorber and to a pair of ordinary elastic shock-absorbers. There is a similar gear on each side of the fuselage. Thus, on landing, as the wheels rise, they also lift the levers against the action, first, of the oleo, and then of the elastic absorbers. The levers above referred to are of welded steel box construction, and it will be noticed that the wheels are splayed, so that when in flight they point inwards in a down direction, and when on the point of landing they are more or less horizontal, and when the machine is at rest, with its full weight on the wheels, they point inwards in an up direction. The general arrangement and construction of this landing gear is clearly shown in our illustrations.

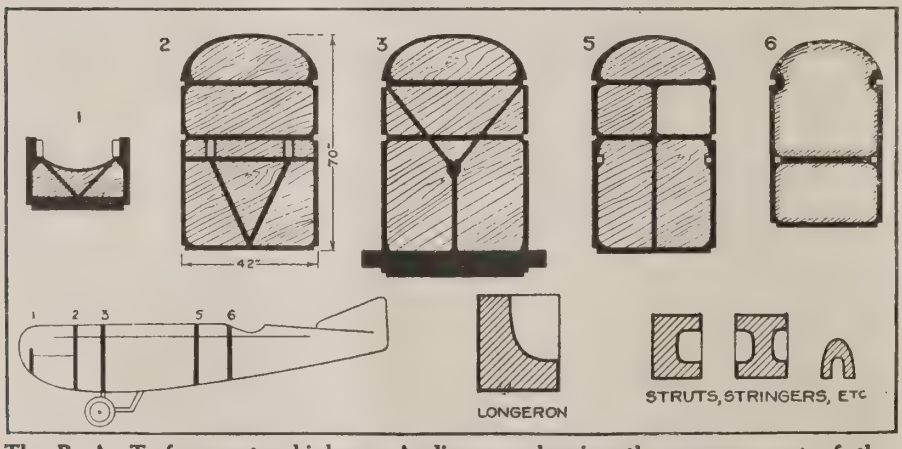


The B. A. T. four-seater biplane—The original landing chassis showing on the left the shock-absorbing gear, and on the right the hinged stub axles and hub at the top, and below, a general view of the chassis

Another interesting feature is in the tail skid. This is of the steerable type, and consists of a short steel-shod wooden skid anchored at its upper end to a tube passing up through, and secured to, the rudder post. The "head" of the skid is connected to a lug some distance up the rudder post by two telescopic tubes passing up through the rudder, and containing a steel spring, which absorbs the shocks on striking the ground.

The engine is a Rolls-Royce Eagle, VIII, mounted, as previously stated, on two strong ash bearers between the first and second formers. It is enclosed by an aluminium bonnet, whilst a "manhole" in the bottom of the fuselage gives access to the engine from underneath.

The cooling system is very efficiently carried out, and is made up of two long streamline-shaped "honeycomb" radiators, mounted one on each side of the fuselage. They are conected top and bottom to two tanks within the fuselage, as indicated in one of the accompanying sketches. On the back of each radiator is a shutter, which can be opened or closed from the pilot's cockpit. A neat and simple oil-cooling radiator is also fitted; this is shown in one of our sketches, and consists of an extension of the oil tank next to the engine projecting through the starboard side of the fuselage, and having a series of tubes passing through it from front to rear. This projection also carries the oil filter and filling-cup. As pretviously mentioned, the fuel tanks are located in the compartment between the engine and the cabin. Petrol is delivered direct from the main tank to the carburetor through the agency of two windmill pumps mounted above the turtle-deck and the tanks. There is, however, a small service tank, for emergency, let into the leading edge of the top centre section.



The B. A. T. four-seater biplane—A diagram showing the arrangement of the formers in the fuselage

The estimated maximum speed of the B.A.T. F.K. 26 is 110 m.p.h., whilst the landing speed is about 40 m.p.h.

Book Reviews

Applied Mechanics, Vol. II, *by Charles E. Fuller and William A. Johnston.* This volume has been prepared primarily for the use of students in the Departments of Engineering in the Massachusetts Institute of Technology and is intended to cover the fundamentals of the subject in as far as they may be required in subsequent work in structural and machine design and in the ordinary problems of engineering practice. As preparation a student should have a knowledge of Differential and Integral Calculus, the principles of Statics and Dynamics, and the methods of determining centers of gravity and moments of inertia of areas of solids. Considerable attention has been given to the logical development of the subject and care has been taken to point out the limitations of the different theories; emphasis being laid on the divergence of the conditions met in practice from the ideal conditions, under which the theoretical formulas are deduced, and on modifications necessary, or advisable when the formulas are used under ordinary working conditions. Some of the subjects treated of in this invaluable publication are physical properties, materials, analysis of stresses and strain, unform stresses and uniformly varying stresses in beams, deflection of beams, continuous beams, combined stresses, general theory of flexure, columns, shafting and springs, curved bars, etc. Price is $4.00, post paid.

Gas, Gasoline and Oil Engines, *by John B. Rathbun.* A simple, practical and comprehensive book on the construction, operation and repair of all kinds of engines, dealing with the various parts in detail and the various types of engines and also the use of different kinds of fuel. This volume contains a valuable and complete gas engine glossary. Price $1.35, post paid.

Gas Engine Troubles and Installation with Trouble Charts, *by Rathbun.* A book that shows you how to install, operate and make immediate repairs and adjustments on all types of gas, gasoline and oil engines. Complete and indexed trouble chart for ready reference included therein. Profusely illustrated. Price is $1.35, post paid. Procurable at the Aeronautic Library, Inc., 299 Madison Avenue, New York City.

THE DESIGN OF AEROPLANE FITTINGS

By E. S. BRADFIELD

Formerly of Naval Aircraft Factory

IN the testing of complete aeroplane parts, such as fuselages, tail units, wings, etc., it is shown very clearly that failure usually took place in the metal fittings or their attachment to wooden members rather than in the main parts, such as beams, longerons or wires.

In starting the design of aeroplane parts, it is first necessary to have a stress diagram showing the direction and magnitude of the forces acting on the principal parts. From this diagram it is easy to pick out the forces acting at a single point, where a metal fitting is used to connect beams, struts and wires.

After finding the forces acting it is next necessary to resolve them into components acting parallel and perpendicular to the main part, as a wing beam. Having done this, the finding of the dimensions and design of the metal fittings is easily determined by the following charts.

A chart for determining the thickness of metal required in wire attachment lugs and also in the fitting is shown in Figure 1. The figures at the left bottom are the forces acting in pounds. The left hand graphs are the bearing strengths of metal used. The right hand graphs are the bolt sizes, and the bottom right hand figures are the metal thicknesses. Having the force acting we go up vertically to the bearing strength, then horizontally to the bolt size, and down to the thickness required.

Figure 2 is a chart for determining the bolt size. At the left is the force acting parallel to the grain of the wood. The graphs are the bolt sizes, and at the bottom is the wood thickness for both spruce and ash, when stressed at 3,500 to 5,500 pounds per square inch respectively.

Having the force acting and the thickness of the wood, we find their intersection, and the bolt size that this is on or below is the proper size of bolt.

A chart for finding the area of metal fitting required against the wood is given in Figure 3. At the left is force acting perpendicular to the grain of the wood, and at the bottom are the areas required both for spruce and ash when stressed at 450 and 1,150 pounds per square inch respectively. Having the force and going horizontally to the datum line and then down, we find the area required on the wood.

Figure 4 is for determining the width of metal required in a wire lug or other part under tension. At the bottom right is the force acting. The right hand graphs are the tensile strengths of the metal used, and the left hand graphs the width of metal, and the left bottom figures are the thicknesses.

Having the force, tensile strength and thickness, we go from the force up to the strength, then horizontally until we intersect the thickness and reading the graphs get the width required.

Below is a table, Figure 5, giving the strength of 3½ per cent nickel steel bolts, both in tension and single shear.

Bolt Size	Strength in Single Shear	Tensile Strength at Th'ds
⅛	1000	800
5/32 No. 8	1500	1300
3/16 No. 10	2150	1800
7/32 No. 12	3000	2500
¼	4000	3400
5/16	6100	5400
⅜	8800	7700
7/16	118800	10500
½	15500	13500

Figure 5

Figure 6 is a table that gives the minimum thickness that may be used for different areas of flat metal to have the necessary stiffness. The force is considered as acting at the center of area. When ribs or flanges are used to stiffen the part this data does not apply, and a calculation or test must be made to determine whether or not the fitting is stiff enough.

Thickness B. W. G.-In.	Area.
16	3½
14	5
12	8
⅛	12

Figure 6

An example will now be given of the use of the above charts. Figure 7 shows the forces acting at the attachment of a drift strut to a wing beam, that is the actual force times

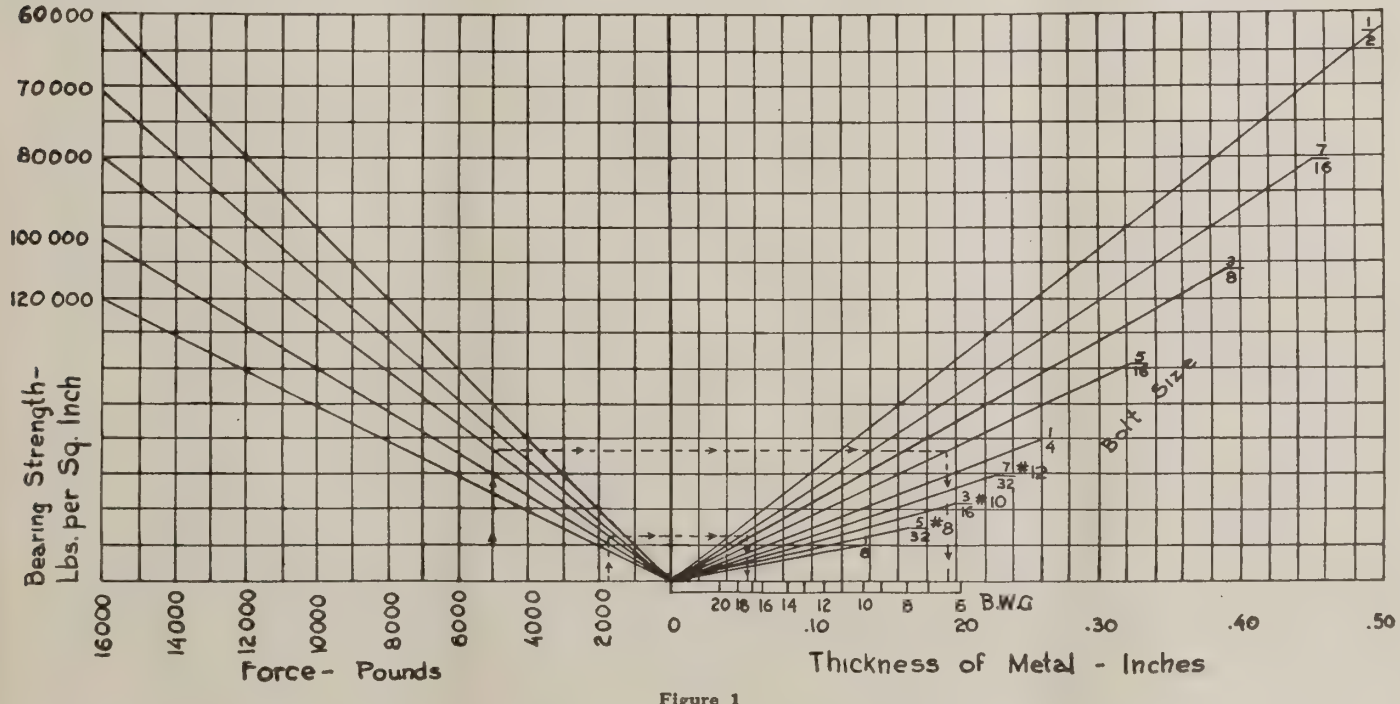


Figure 1

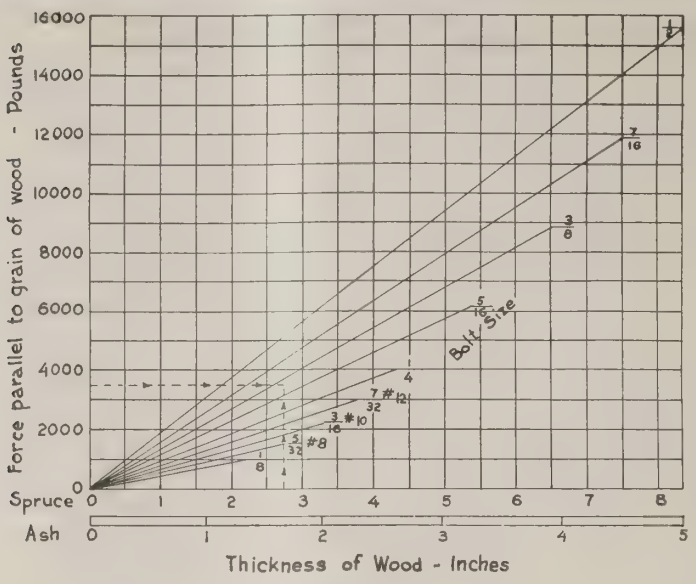


Figure 2

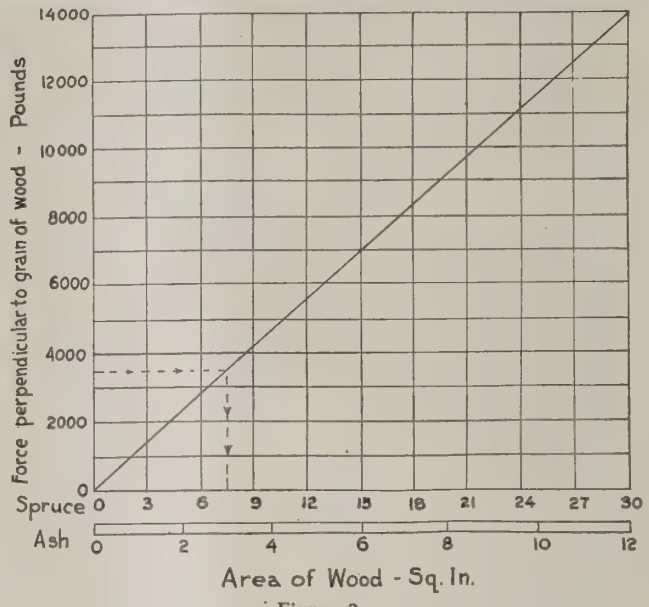


Figure 3

a suitable factor of safety. The beam is assumed 2¾ in. thick. It is first necessary to find the size of the bolts E and F. Experience has shown that in most cases the bolt size is determined by the area required on the wood to resist sliding of the fitting along the wing beam. As the fitting does not surround the beam, the bolts are effective for only half their length, or 2¾ in. in all for both bolts. The force is 3,500 pounds. Turning to Figure 2, we find that the minimum bolt size is ⅜ in.

The force acting on the strut B is 3,500 pounds, which is transmitted to the fitting and by it to the beam. Referring to Figure 3 we see that for a spruce beam the area of the fitting should be 7½ sq. in.

From Figure 6 we see that for this area No. 12 gage metal should be used to get the required stiffness. It is now necessary to find out if this is thick enough to transmit the force to each bolt, which is 1,750 pounds. Following out the data for 1,750 pounds, 80,000 pounds bearing strength and ⅜-in. bolt in Figure 1, we find that No. 17 gage metal would be thick enough, so we are well on the safe side, as from stiffness use has to be made of No. 12 gage. It is apparent that otherwise No. 17 gage would have been used.

From a study of Figure 7 it will be seen that the bolt E transmits some force to the washer W. As the fitting is of fairly heavy material, we shall assume that two-thirds of the

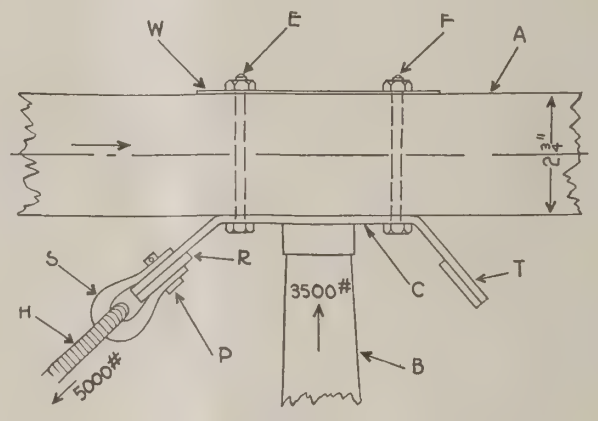


Figure 7

vertical component of the wire pull is transmitted to the washer W, or 2,500 pounds.

From Figure 3 we see that this requires an area of 5 sq. in. under the bolt E, and from Figure 6 we find that No. 14

(*Concluded on page* 1184)

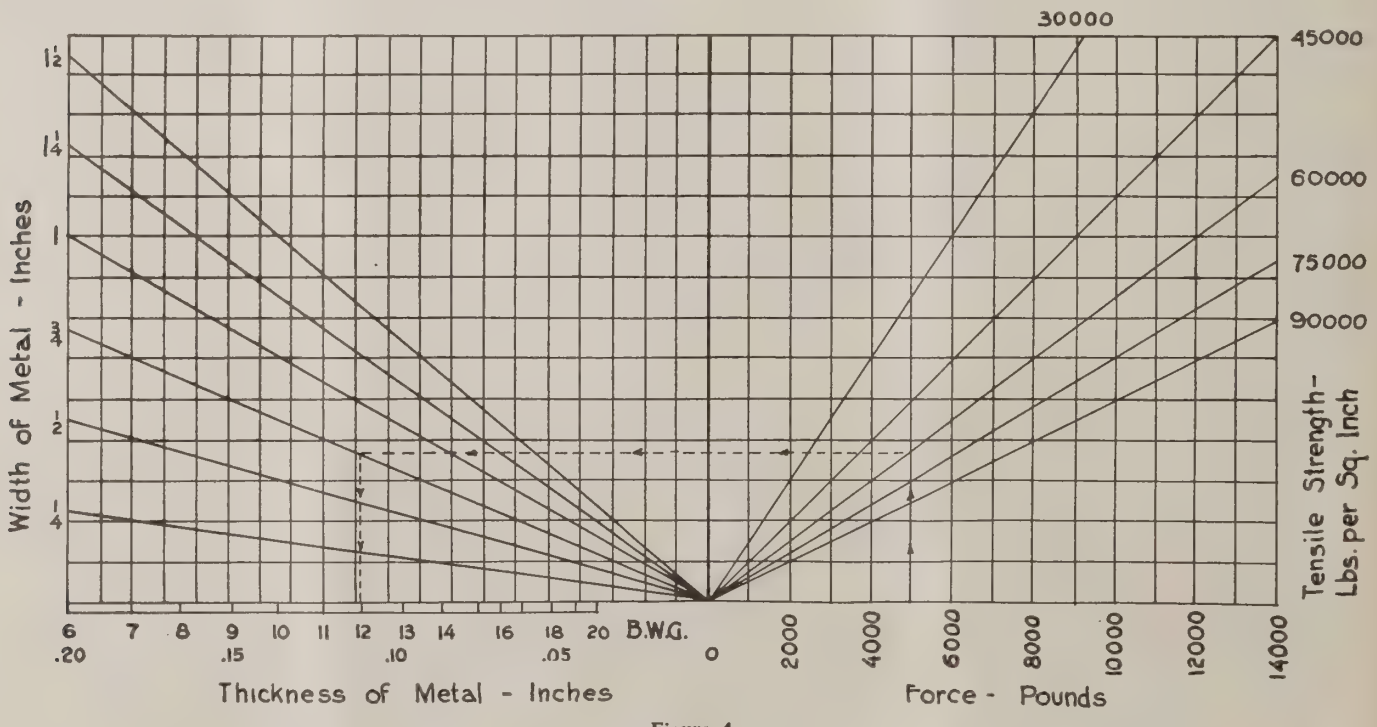


Figure 4

DEVELOPMENT OF AN AEROPLANE SHOCK RECORDER

By A. F. ZAHM, Ph. D.

Bureau of Construction and Repair, Navy Department*

TO meet the current needs of the aeroplane designing staff of the U. S. Navy, an aeroplane accelerometer was developed for measuring the sudden loads and shocks encountered in flying and landing. An elaborate instrument of precision was not called for, but rather a device whose records could be obtained easily and read directly. For the scale drawings and early tests of the design here described the writer is indebted to his assistant, Mr. L. Crook, who first calibrated the accelerometer, then used it on a flying boat to measure landing shocks.

Fig. 1 pictures the instrument in course of development. It consists of many vertical styluses, or pointed rods, supported individually by springs and recording on a single chronograph drum over which passes a continuous sheet of sensitized paper. For measuring upward accelerations the rods, which are all of the same mass, are pressed upward against stops by springs of graded intensity, while their pointed lower ends, or needles, are held within a few thousandths of an inch of the chronograph drum. When acceleration occurs a certain number of styluses begin to record instantly, as the intensity of the force overcomes in succession stronger and stronger springs.

When preparing the instrument for any proposed measurement one sets the springs so as to meet any probable accelerations that will have to be recorded. By means of the sliding sleeves shown in the photograph the force of the springs can be adjusted so as to equal any multiple of the weight of a rod. To this end one applies in succession to each stylus, by contact with a weighing scales, forces which are multiples or fractions of the whole fixed weight of the rod plus half the weight of the spring, while the springs are adjusted so as barely to support the rod against the stop. A single rod of brass weighs about 1¾ ounces, being 9/32 inch diameter by 5 inches long.

To prevent the needle from scratching or puncturing the paper it is cushioned against a spiral spring inside the holder, or vertical rod, within which it can otherwise slide freely. The needle at its middle is provided with a shoulder abutting against the upper end of the small holding and adjusting screw. This screw can, by rotating, raise or lower the setting of the needle, and is securely fixed in place by the jam nut shown at the bottom of the rod. The needle is of brass or German silver, and makes a clear, fine mark on the chemically treated paper when the pressure is 3 per cent or more of the weight of the holder. One per cent of the weight would be sufficient pressure with styluses 50 per cent longer and thicker, for a test has shown that .05 ounce pressure of the needle causes a clear trace.

In the position and adjustment shown, the present instrument records only upward accelerations, but by inversion can, without further adjustment, record downward accelerations, provided account be taken of the reversed direction of gravity. Thus, if when upright, the stylus exerts on the stop a pressure nw, inverted it exerts $(n - 2)\ w$; and hence records accelerations $ng\ (n + 2)\ g$, w being its weight. Without inversion the instrument also records negative accelerations if the styluses be pressed downward against their stops. Also in its upright position the instrument records both positive and negative accelerations when the springs are set so that some styluses are pressed upward and others downward.

*Reprinted from the Franklin Institute Journal.

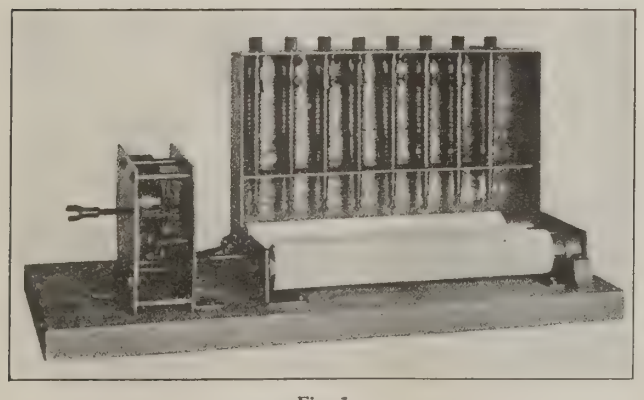


Fig. 1

The special stylus shown on the right of the photograph is provided at its upper and lower ends with thin cantilever springs which prevent it from rubbing against the guide plates of the containing box, and at the same time hold the rod upward against its stop in the manner described for the spiral springs. An instrument with such cantilever, or anti-friction, springs could be used to measure horizontal as well as vertical acceleration.

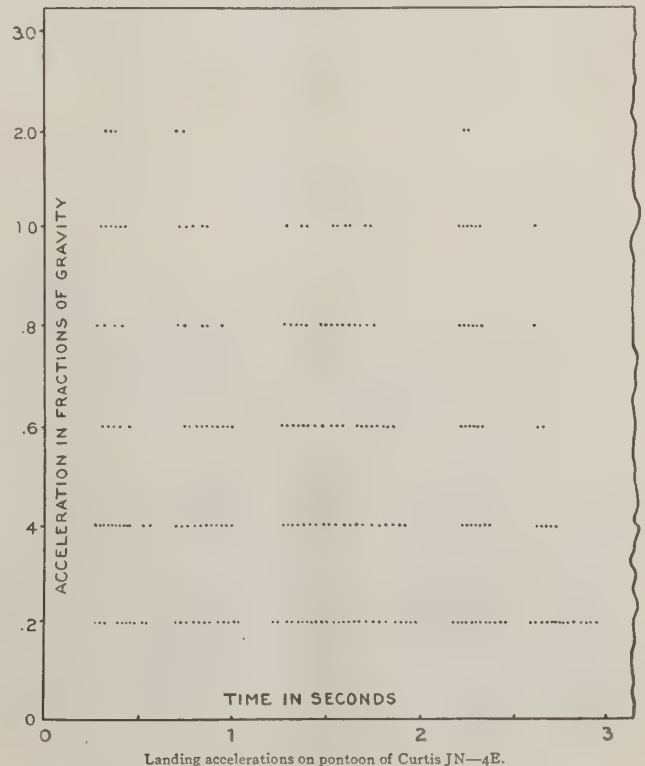
In the form here shown the instrument is provided with 6 feet of paper driven by an alarm clock at the rate of 2 inches per second for such accelerations as are found in aeroplane experiments. This rapidity is essential in order to separate and clearly disclose landing shocks and structure vibrations; for it is usually the short hammer-blow shocks of a few hundredths of a second duration which most stress the under parts of an aeroplane in alighting on land or water.

In action the instrument appears to be fairly instantaneous and free from the oscillations found in a spring accelerometer whose recorder has a considerable displacement. Thus each needle records without interruption a definite continuous acceleration beyond a certain intensity, but instantly ceases recording when the acceleration falls below this amount. It can also simultaneously record long and short accelerations. For example, engine tremors superposed upon an air swell cause a needle to make a dotted trace, the length of the trace representing the duration of the swell beyond a certain intensity, and the distance between dots representing the period of the engine tremor. In fact, a known engine speed serves to standardize that of the paper, and a known paper speed that of the engine. The aggregate tracings of all the needles form a shaded diagram whose contour is a wavy line like that of a spring accelerometer.

An example of typical records taken on a seaplane is presented in Fig. 2 of this report. The farther stylus, which has its restraining spring adjusted to record upward accelerations of twice gravity, has made a few instantaneous traces separated by long blanks; the one set for two-tenths of gravity has made long traces with short blanks. Both records are dotted, showing engine tremors. Feeble accelerations were expected, otherwise a more suitable setting of the springs would have been made. They should have been graded to tenths in the region of two gravities.

Fig. 3 gives an acceleration record of an approximately

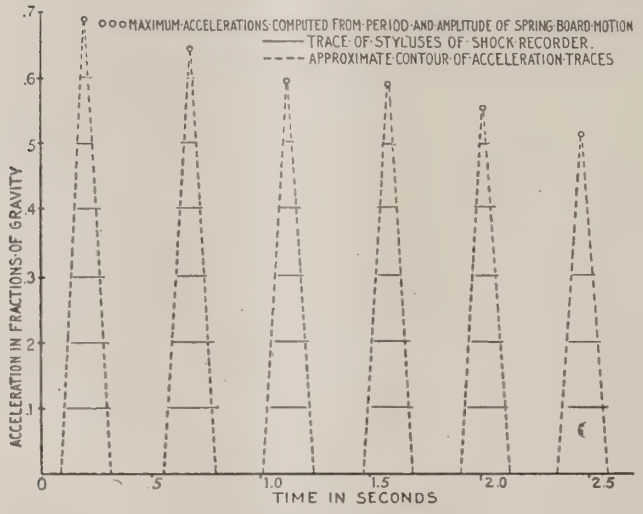
FIG. 2.



Landing accelerations on pontoon of Curtis JN—4E.

simple harmonic motion, somewhat damped, made with the instrument screwed to the end of a vertically vibrating spring-board clamped in a firm vise on a not very firm table, and with its styluses set only for positive accelerations. Plotted on the same diagram, as a line of small circles, are the simultaneous maximum accelerations of a needle inserted in the end of the spring-board and playing on a sheet of smoked paper moving steadily past it. The line of circles is a "damped" harmonic with a perceptible "overtone," and matches the damped acceleration trace taken simultaneously, all records being equally distant from the face of the vise. The actual tracing of the spring-board tip is given in Fig. 4, and the method of computing from this the maximum accelerations, which are indicated by the circles in Fig. 3, is developed in the following paragraph.

FIG. 3.



Calibration diagram for shock recorder.

Without rigorous precision the general equation to the vertical motion of the spring-board tracing point may be written

$$\ddot{s} + a\ddot{s}^2 + b\dot{s} + cs = o$$

in which s is the displacement, at any time t, from the point of rest under gravity, and $a\ddot{s}^2$, $b\dot{s}$, are retardations due to the air resistance and internal friction of the vibrating system. The maximum acceleration for any one vibration occurs when $s = o$, and may be written from the equation

$$\ddot{s} + cs = \dot{o}.$$

It is

$$\ddot{s}_1 = -cs_1$$

in which s_1 is the momentary amplitude. Since the damping is small, s_1 can also, without material error, be written in the more familiar form

$$\ddot{s}_1 = -4\pi^2 n^2 s,$$

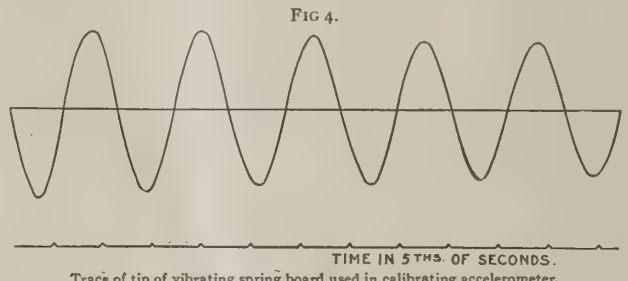
when n is the frequency. Now, since $\ddot{s}_1$ is approximately recorded by the acceleration styluses, and s_1, n, are found in the record of the vibration stylus, the one record can be checked with the other. This method was used in computing from the trace of the spring-board's motion, the accelerations indicated by circles in Fig. 3.

The acceleration records are fairly trustworthy as far as they go, but lack continuity, like the markings on a yardstick. To disclose accurately the maximum acceleration in any shock the adjustment of the springs must be close-graded. Thus, if a maximum acceleration of twice gravity be recorded by styluses graded to tenths of gravity, the greatest possible error is presumably one-tenth of gravity, or 5 per cent of the quantity recorded, while the probable error is 2½ per cent. Still closer estimates can be made by sketching in the contour of the traces. The free play of the styluses between their stops must, of course, be kept small.

Closer agreement between the two sets of superposed values in Fig. 3 would ensue if the clock ran uniformly; if the paper were uniformly thick, instead of being spliced; if the needle points were set 0.004 inch from the paper, instead of 0.012 inch; and if the styluses were given less play between their stops. These adjustments would be made in refining the instrument. But, even so, the records would not everywhere accurately disclose the acceleration, unless made with numerous styluses in close-graded adjustment. At one point, such as the third crest in Fig. 3, the record might be a mere dot, and hence indicate the acceleration truly; at another it might be a dash, leaving the true crest to be extrapolated. Numerous and close-graded styluses can, of course, be provided without much increase of cost or weight, if found desirable for special investigations.

For the immediate measurements in view it was thought unnecessary minutely to calibrate the shock recorder to a close-grade scale by experiment. Continuous recording instruments are in the market, such as the R A F photographic accelerometer, or in development, such as the Sperry mechanically recording accelerometer, and these may be had in time. The present instrument has served a passing need, and

FIG 4.



Trace of tip of vibrating spring board used in calibrating accelerometer.

may prove useful for disclosing hammer-blow shocks too sudden to be faithfully recorded by accelerometers of another type.

For a comprehensive field laboratory study of the accelerations throughout an aeroplane it may be well to measure simultaneously the shocks in the undercarriage, the body and the wings. This can be done either by placing individual recorders in those parts, and synchronizing them, or by placing shock receivers there and recording on a central chronograph. The present instrument, or a simpler one consisting of plane bar springs, could be used as a contact maker in various parts of an aeroplane to operate recording magnets at a central drum. Such an apparatus can easily be arranged, and may be expected to record with about the promptness of a ballistic or an astronomical chronograph.

For instantly indicating to the pilot the comparative stressing in his machine a number of simple bar-spring contact makers of graded strength can be coupled to a row of tiny electric lamps on the instrument board. These would brighten successively, and indicate by their various colors, positions, or markings, the degree of stress put upon his craft. A tentative instrument of this kind has been tried incidentally to the present study. Such cantilever styluses, or contact makers, have the simplicity and compactness of a row of piano keys, but are not preferred to the endwise-moving styluses because they are more affected by angular accelerations about their centers of gravity, or points thereabout, than are the rods used in the present instrument. Obviously the contact points could be used with a smaller gap than have the needles recording on paper.

Without its base the present instrument, whose case measures 9 inches by 6 inches by 1.5 inches, weighs 8 pounds, being made almost wholly of brass. By using aluminum, where practicable, the whole weight can be reduced to about 2 pounds. In this style the clock would form part of the case, and the whole could be screwed to the instrument board of an aeroplane.

NAVAL and MILITARY AERONAUTICS

Aero Squadrons on Duty at the Border

Washington, D. C.—According to a statement issued by the Director of the Air Service, leading ship No. 1, Flight "B" Eighth Aero Squadron, with Lieutenant Rex Stoner, flight commander, and Captain D. W. McNabb, commanding officer, as passenger, left Kelly Field for border duty at Laredo, Texas. Ships were flown in Vee formation entire distance of one hundred eighty miles.

The following units are now operating as border patrol flights:

McAllen, Texas—Headquarters and "A" Flight, 8th Aero Squadron.

Laredo, Texas—"B" Flight, 8th Aero Squadron.

Marfa, Texas—"A" Flight, 11th Aero Squadron.

El Paso, Texas—Headquarters 1st Bombardment Group.

Headquarters and "B" Flight, 11th Aero Squadron.

Headquarters and "B" Flight, 96th Aero Squadron.

Douglas, Ariz.—"A" Flight, 96th Aero Squadron.

Vacancies to Be Created by Legislation to Be Filled by Emergency Officers

Washington, D. C.—The War Department authorizes publication of the following information:

In filling such vacancies as may be created by future legislation reorganizing the Army, it is the policy of the War Department to select appointees from among persons who served as emergency officers during the war with Germany. Equal consideration will be given to all applications, whether the applicant is still in the service or necessarily has been discharged in the process of demobilization. No appointment will be made without a thorough and satisfactory final examination. All appointments will be provisional for a period of two years, during which time the appointment may be terminated should the provisional officer be found unsuitable for permanent retention in the service. Examinations will not, of course, be authorized until the enactment of legislation creating vacancies in the permanent military establishment.

A previous announcement of the War Department permitted the erroneous interpretation that preference would be given to emergency officers still in service in preference to discharged emergency officers.

Sales of Surplus Supplies

Washington, D. C.—The present status of surplus supplies is announced in a statement prepared by the Statistics Branch of the General Staff. The figures include all sales made up to August 15. The etsimated surplus on January 1, 1919, chargeable to the Department of Military Aeronautics was $85,000,000, of which $21,900,000 or 26 per cent. has been sold. $10,300 000 or 17 per cent. of the Bureau of Aircraft Production's $62,000,000 surplus has been sold.

Historical Branch of General Staff Seeks Photos of Army Activities

Washington, D. C.—The War Department authorizes publication of the following information:

There are scattered throughout the service many kodak films and plates, depicting the activities of the army in the United States, abroad and in our foreign possessions. This material covers a period of many years, extending back to dates before the activities of the photographic section of the Signal Corps commenced. These photos are of great value to the War Department for historical purposes and, incidentally, for the use of the recruiting service or other instrumentalities of the War Department, with a view to preserving these photos and the official use of them as the War Department desires, the Adjutant-General requests co-operation of all officers in the service. Films, plates and prints depicting activities of the army should be forwarded to the Historical Branch, War Plans Division, General Staff, with such descriptive matter as will identify the photos as to personnel, military unit, place and date.

Aviation Camp to Be Established in Arizona By Air Service

Douglas, Ariz.—According to a statement appearing in the local press, it is stated that a permanent aviation camp is to be constructed east of Camp Harry J. Jones. The decision is said to have been reached by a board of officers examining possible sites.

Thirty-five buildings will be constructed. In addition to the enlisted personnel, it is said about fifty officers, including flyers and ground forces, will be stationed at the field.

Aviation Construction Work in U. S. Only 1 Per Cent of Army's Total

Of the $818,000,000 expended by the army for construction purposes, it is stated that only $8,000,000, or 1 per cent, was used on aviation and signal corps projects.

Insignia for Naval Aviators, Student Naval Aviators and Flying Mechanicians

Washington, D. C.—Acting Secretary Roosevelt authorizes the following:

The Navy Department has approved the change of naval aviator device as follows:

The present gold pin with double wings based on the shield and anchor will be worn only on wash summer uniforms. The winter uniforms will carry a similar device of gold embroidery. Provision has been made by the new regulation which designates student naval aviators and flying mechanicians. The student wears a pin similar to that of the graduate aviator, with the exception that one wing is removed, leaving a device similar to that worn by observers abroad. Regular members of seaplane flight crews among the enlisted men will wear a pin similar to that of the student naval aviator, except that it shall be of silver.

This change is made with the belief that there should be a distinctive insignia for the graduate and student naval aviators, and further that the flying mechanician should also be entitled to wear some mark of distinction.

New Reserve Military Aviators Named

Washington, D. C.—The following-named officers, having completed the required tests, are rated as Reserve Military Aviators, to be effective from the date set after their respective names: Captain Roy N. Francis, June 10, 1917; Second Lieutenant John M. Coleman, July 13, 1919; Captain Herbert G. Knight, July 24, 1919; First Lieutenant Francis T. Murphy, July 24, 1919; Second Lieutenant Verne M. Monticue, July 24, 1919; Second Lieutenant Alfred L. Coe, July 24, 1919.

12,000 Tons of Air Service Property to Be Returned from A.E.F.

Washington, D. C.—According to a statement from the Statistics Branch of the General Staff, there remain 12,830 short tons of Air Service property to be returned from A. E. F. This is 7.2 per cent of the total army equipment still overseas.



A French S.E.A. two seater biplane which climbs 17,000 feet in 21 minutes and has a speed of 129 miles an hour at 6,500 feet

FOREIGN NEWS

Air-Cooled Bristol Engine Tested

London, England.—A new British scout machine powered by a new type of Bristol engine received its preliminary tests recently. The engine develops 450 horsepower. It is of nine cylinder type and weighs but 636 pounds.

$320,000 in Prizes to Be Offered by British Government

London.—The British Government will offer prizes amounting to $320,000 for aerial competition, it was announced by an Air Force officer in the House of Commons.

100,000 Yen Prize for Japanese Cross Country Race

Tokio.—A cross country race for prizes totalling 100,000 yen ($50,000) over a course 1,200 miles long is taking place in Japan during the months of July and August, according to information recently received. The first prize is 30,000 yen, the second 20,000 yen and the third 10,000 yen. The route is from Kagoshima to Sapporo. The landing places and distances are as follows:

	By railway.	By air.
Kagoshima-Fukuoka	170 miles	130 miles
Fukuoka-Hiroshima	190 miles	142 miles
Hirosh.ma-Okayama	97 miles	75 miles
Okayama-Osaka	114 miles	86 miles
Osaka-Toyohashi	160 miles	120 miles
Tokyo-Sendai	215 miles	176 miles
Toyohashi-Tokyo	189 miles	142 miles
Sendai-Morioka	115 miles	85 miles
Morioka-Aomori	127 miles	95 miles
Aomori-Sapporo	200 miles	150 miles
Total	1,577 miles	1,201 miles

A specified test flight is required before the contestants can participate. Only Japanese aviators may compete.

Unique among the conditions is a 50 per cent deduction if the prize is won by a foreign-built 'plane and a 30 per cent increase in the prize if the machine is entirely of Japanese construction, with the exception of the magneto.

Compensation for accidents or injuries sustained during the contest will be made to all participants. Loans for purchase and construction of machines and for expenses will be advanced to any competent aviator.

Aerial Competition in Fortugal

Lisbon.—An aerial contest over a course from Lisbon to Oporto to Vianna to Lisbon is being organized as a test for the contemplated flight from Lisbon to Guinea.

Regular London-Paris Aero Passenger and Freight Service Started

London.—A new freight and passenger aeroplane service between London and Paris was inaugurated on August 25.

The aeroplane 4-A left London at 9:08 o'clock and returned at 2:45, completing the round trip in five and three-quarter hours. Two firms have started daily flights simultaneously, charging $75 to $100 single fare. Considering the advantages, these prices are not held to be exorbitant. Great hopes are held out that these fares will be reduced as operating conditions become better, and with bigger, better 'planes capable of carrying heavier loads.

These 'planes carry one ounce of mail for $1. As it is possible to send 5,000 words for this sum, the rate is considered cheap. Cable tolls to Paris average 5 cents a word, and the aeroplane men say they will soon be able to beat the cable. The manufacturers say they have plans for reducing the time between the two cities to one hour and that this may be realized in one year.

French Aviator Flies Twice Under Var Bridge

Nice, France.—Aviator Maucon, with a local newspaper reporter as a passenger, twice flew through the arch of the Var River bridge on August 24. The arch is 66 feet wide and 26 feet high.

New Zeppelin Passenger Carrier in Successful Test

Berlin.—A new Zeppelin airship, on its maiden trip from Friedrichshafen to Berlin, covered the 435 miles in a little more than six hours. The aircraft, which is named the Bodensee, attained a maximum speed of 74½ miles an hour.

The builders of the new type machine have discarded the familiar cigar shape of the old Zeppelins and adopted a conical outlined exterior. The Bodensee is 360 feet long and accommodates thirty-five passengers. The aircraft is to go into a daily service.

Twenty-one passengers, among them three women, made the initial trip.

1,000 Horsepower Aeroplane Engine Tested in England

Wolverhampton, Eng.—An experimental aeroplane engine developing between 900 and 1,000 horsepower was put under test here recently. The 12 cylinders are arranged "V" fashion and the weight is less than 2,000 pounds. Special aeroplanes are to be constructed for the engine.

Prizes Offered for Valve Design in Germany

The Society of German Aircraft Constructors, in order to standardize design and produce more efficient models has offered three prizes for gasoline valves for aircraft engines. A prize will be awarded for the best design of each of the following types: the ordinary trough type, the three-way type, and a three-way by-pass type.

The Third Annual Aeroshow at Taliedo

Milan.—The third Milan Aeroshow at the Taliedo Flying Ground consists of a series of highly interesting exhibits, consisting chiefly of war machines. The Milan-Venice dirigible ship is operating from the field. The journey is made at three times the speed of the railway at four times its cost. Lunch is included in the 300 lire fare.

No fewer than eighty flying machines are on exhibit, exclusive of lighter-than-air vessels. These eighty may be divided into sections of historic and modern war and peace craft, and a section that contains enemy machines. The Bergonzi "canneton," or young "canard," a biplane with Anzani 45 h.p. engine elevators in front, daring vertical and horizontal dihedrals to the planes, is a very radical design. Of interest in connection with instruction is the Gabardini tethered monoplane and his chief pilot's foot-controlled runabout (steered by the feet only), which are used to get pupils accustomed to the feel of things before going up and wasting an instructor's time.

A number of excellent motors are exhibited, including the Perfetti-Dolara 300 9-cyl. air-cooled rotary with cylinders parallel to and revolving round the crankshaft, which is to say parallel to and revolving round the longitudinal axis of the aeroplane, and in a line with the direction of flight of the machine. The cylinder heads face the blast of the displaced air much as a revolving cowl of a tractor screw seems to do, and the big ends of the piston rods appear to transmit rotary motion to a flywheel at right angles to the motor axis, that is in the normal position of a flywheel in respect of the propeller.

The Fiat biplane intended to cross the Atlantic is undergoing trials here.

Spanish Air Routes to Open Soon

Madrid—Regular mail and passenger service between Malaga and Melilla (Morocco), and between Barcelona, Alicante, Rabat (Morocco), and Tolouse are to be put in operation within the next few weeks.

Representatives of a French aerial transport corporation are visiting Seville to complete arrangements for a Paris-Bordeaus-Madrid-Seville-Algiers service.

Handley Page Service Between Damascus and Bagdad

Cairo, Egypt—A number of British officers have left here with a Handley Page biplane to inaugurate the Damascus-Bagdad air line. The distance is 500 miles, a part of which is over the Syrian Desert.

185,000 Aircraft Workers in France

Paris—Le Petit Parisien publishes figures concerning France's efforts to provide her flying corps with necessary materials.

In 1915 France built 3,400 aeroplanes, 7,552 in 1916, 22,751 in 1917, and 34,219 during the first nine months of 1918.

The aeroplane factories employed 12,650 workers on Jan. 1, 1915; 30,960 on Jan. 1, 1916; 68,920 on Jan. 1, 1917; 131,551 on Jan. 1, 1918, and 186,003 on Nov. 1, 1918.

A Larger Caproni Triplane

Rome, Italy—A larger and speedier Caproni triplane is described in news dispa ches emanating from Rome. It is powered by 5 Liberty or Rolls-Royce Eagle engines of 400 horsepower each, driving two tractor and three pusher propellors. The span is over 98 feet. The total length 52, the height 26. The lifting surface is 2,801.7 square feet; the weight empty 7 tons; loaded 12 tons.

The fuselage extends through the center wing. There is accommodation for eight passengers in the upper cabin and for twenty-two passengers below. A dressing room and a dining room is provided.

Fiat Doubles Capital

Turin—The capital of the Fiat Company has been increased from 100 million to 200 million liras at a special general meeting just held in Turin. This increase has been made by the creation of 500,000 shares of a nominal value of 200 liras each, to be offered in option to the present shareholders at par, at the rate of one new share for each share now held.

This increase in capital has been decided on in order to transform and modernize many of the present shops with a view to efficiency and economical output and the consequenty lowering of the price of cars.

Other work to be carried out comprises an increase in electrical power for the rolling mills and steel works held by the Fiat Company and producing exclusively for the Fiat motor factories. An increased capital is also required to enable the Company to take up interests either in Italy or abroad in order to prepare the automobile markets for commercial expansion.

Air Force Cadet College to Open February

The Air Ministry announces that a Royal Air Force Cadet College for the training of the permanent commissioned officers of the Royal Air Force will be opened next February.

The place where the college is to be established will be announced shortly. The number of cadets to be admitted on the opening of the college will be 55.

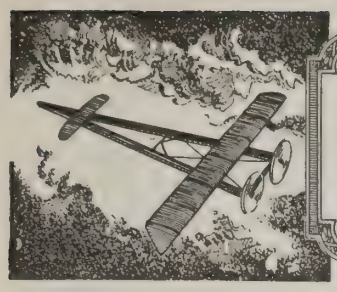
Admission will be by competitive examination. The Air Council fully considered the alternative of admission by nomination combined with a qualifying literary examination.

Alliance Plane in Fast Flight from England to Spain

London—Leaving ts aerodrome at Action at 7 a.m. on July 31, "The Seabird," the aeroplane constructed to fly the Atlantic by the Alliance Aeroplane Co., flew to Madrid, making the journey of nearly 900 miles in seven and three-quarters hours. Capt. W. R. Curtice was the pilot, Mr. J. A. Peters, the designer of the machine was observer. The machine, which is fitted with a 450 h.p. Napier Aero engine, carried only 350 gallons of petrol, although the full capacity is 500 gallons. "The Seabird" carried a gold cup for presentation to the Queen of Spain as a memento of the occasion, also a letter from Princess Beatrice to Her Majesty, as well as a parcel of newspapers.

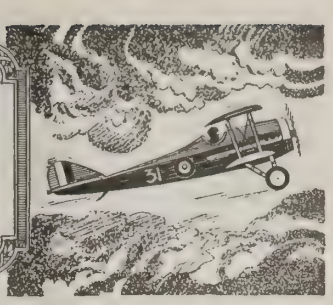
Aerial Mail for India

London—"A detailed scheme for an inland aerial postal service in India is being considered by the Government of India," says Mr. H. G. Perry, the "Daily Express" correspondent at Bombay. "A beginning will be made very shortly with a Bombay-Karachi seaplane service, in which the Governor of Bombay is taking a very lively interest. A service will probably be in full swing early next year. It will link up Delhi, Simla, Bombay, Calcutta, Karachi, Poona, Lahore and Madras. I understand that the Government has definitely decided on a State service.



ELEMENTARY AERONAUTICS and MODEL NOTES

By John F. McMahon



MANY readers of the Elementary Aeronautics page have written to the Model Editor asking for instructions and drawings on Compressed Air Motor models. To help these readers and others who might be interested in this type of power plant we are reproducing cuts that appeared last year in AERIAL AGE, as well as photographs of a compressed air model constructed by Mr. R. C. Hansen.

Compressed Air Motors complete or parts for building a compressed air motor can be purchased from the model aeroplane supply houses mentioned in our advertising columns.

The construction of a light weight racing model using this type of motor is very simple.

The general arrangement of the motor and tank assembly is shown at the right bottom of the cut.

The tank should be painted a dull black for effect.

The tank should be blown up by the use of a large foot pump, such as automobilists carry, to a pressure of about 150 pounds. This will take about one hundred strokes of an ordinary 1¼-inch diameter pump. A tire gauge will be needed to determine the proper pressure, as it is dangerous to put more than 150 pounds in the tank. The engine should be run under pressure a few times to work it in, keeping it well oiled up. A small fly-wheel can be put in place of the propeller for this preliminary test.

The construction of the model is such as to provide a support for the motor and tank and also to hold the wings and landing chassis. The engine is fastened to the end of the frame members by the use of two strips of brass bent around the cylinders and fastened with thread and glue.

The tank is fastened by drilling holes in the frame and by inserting the ends of the bolts projecting from the side of the tank to the nut. This makes the frame stronger and keeps it from twisting out of shape, at the same time being the neatest way to fasten in place.

The front landing chassis is made up of umbrella ribs. Where the ends are fastened to the frame the rib is heated red hot and when cool flattened out with a few strokes of a hammer and fastend with thread and glue.

The wheels are of cork or wood 2 in. in diameter. The tail skid is made up of steel wire as shown and is fastened as before.

The rear wheel can be smaller in diameter and is also of cork or wood. The wings should be made as light as possible and are built up of bamboo strips and dowel stick 3/16 in. in diameter. They are of the single surface type, the silk being fastened with glue to the top surface and then doped.

The main spars of the wing should be planed to a half round section. The bamboo strips are fastened to the flat side of the spars. The trailing edge of the wings is formed by stretching strong linen thread from rib to rib as tight as possible. When the silk is fastened in place it will form what is known as a feathered edge and is very efficient.

The main planes have a total spread of 54 x 8 in.; chord elevator is 18 x 4 in. When constructing the elevator the center rib runs to the rear spar only, to allow the plane to set at an angle of incidence to the line of flight.

The pylon or brace over the main planes is made of thin steel wire and fastened at the point shown in the drawings. When ready to fly the model be sure it is balanced properly. It is better to set the entering edge of the plane about 3 in. back of the center of gravity. The elevator can be moved back and forth according to the glide.

It is better to start the model from the ground rather than from the hand, as it is almost impossible to spin the propeller, turn on the air and throw the model at the same time without a chance of mishap.

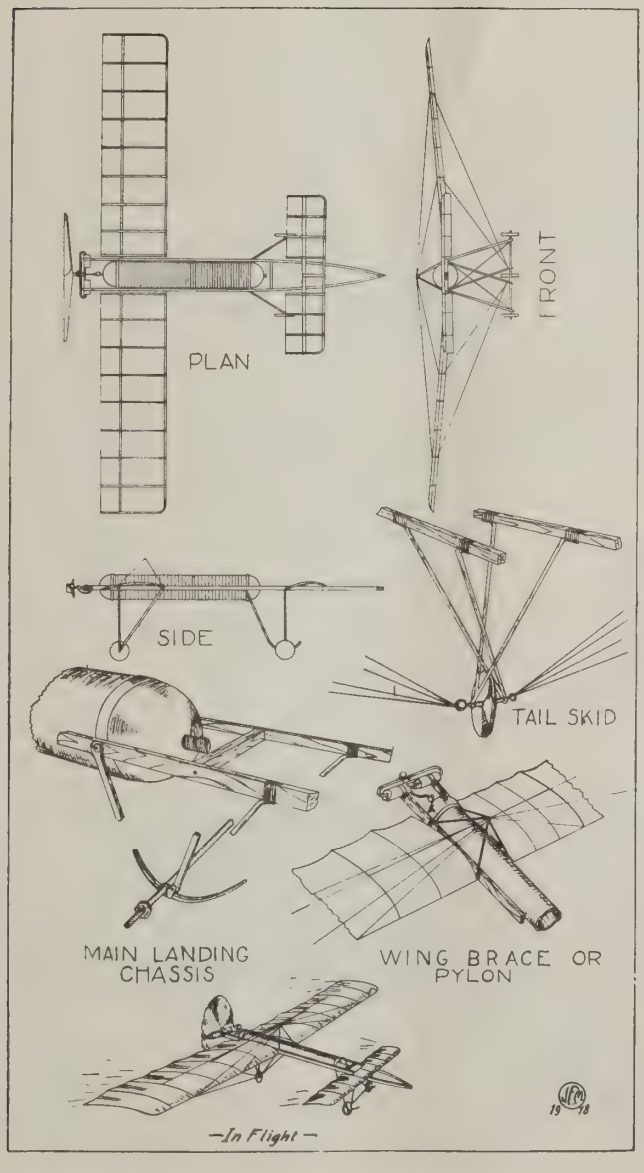
The model builder can construct a sort of trigger arrangement for turning on the air, such as an arm soldered to the air "shut off" and a spring fastened to the tending to hold the valve open; to close, a sort of dog is fastened and when pressed by the finger it moves away, allowing the arm to swing back to the open position.

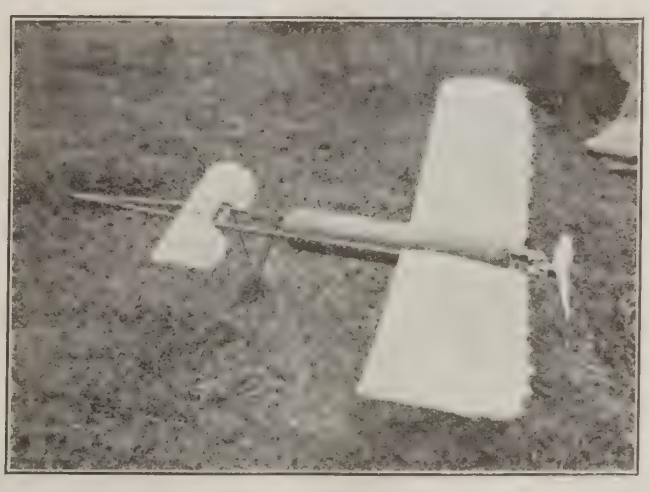
I might call attention to the size of the propeller. This should be from 12 to 16 in. in diameter, but the proper size can be determined by experiment.

The landing chassis must be made long enough to hold the model properly the correct distance from the ground to keep the propeller from striking when getting off.

Flights of compressed air models vary. Some engines I have made showed no leakage of air and the model would not fly as well when the leaking of the air could be heard distinctly. Of course, I do not say that the engine that leaks is the best, but I do believe that if the model builder is unfortunate enough not to make his apparatus air tight he can still get some reward for his work.

Some pretty scale models can be made powered with a compressed air motor. The famous Continental Aircraft Company's pusher is very well suited for this purpose. The tank, which must be made shorter and larger in diameter, takes the place of the body and resembles it a great deal. Drawings of the Continental machine appeared in a previous issue of AERIAL AGE.





A model powered with a compressed air motor constructed by R. C. Hansen of the Pacific Coast Model Aero Club



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Work for Aviators

Only statesmen of the loftiest vision can investigate high prices.—*Brooklyn Eagle.*

Hard of Hearing

Village Constable (to villager who has been knocked down by grape juice bottle dropped from an aeroplane)—You didn't see the number, but could you swear to the plane?

Villager—I did, but I don't think 'ee 'eard me.

Starting It All Over Again

"You don't call me a 'cutie' any more."

"No, girlie, that word is too reminiscent of life in the trenches."—*Manchester Evening Gazette.*

As the Trans-Atlantic Flying Boat Takes Off

On her first trip to Nantasket, little Bess remarked as she looked over the side of the flying boat: "Mama, they put too much bluing in this water."

Which reminds us of another tot who exclaimed on seeing the wake of the flying boat: "Oh, look, mother, the boat is losing all its soap."—*21st Century Chronicle.*

Just Before Flying Over

"So this is the first time you've ever seen the ocean," said her escort.

"Yes; the very first time."

"And what do you think of it?"

"Ah!" she sighed in ecstasy, "it smells just like oysters."—*Boston Transcript.*



The Pop and the Dirigible Hangar—Fontaine Fox in the N. Y. Globe

Long Range Archies

The mere man, desperately seeking for some dinner-table gossip—Shooting stars is the great sight this August.

The fairest (if not the brightest) of her sex—Oh, really, I'd no idea our anti-aircraft guns carried as far as that.—*Blighty.*

Seeing Is Hearing

Sergeant Major: "Now, Private Smith, you know very well none but officers and non-commissioned officers are allowed to walk across the grass."

Private Smith: "But, major, I've Captain Graham's oral orders to——"

Sergeant Major: "None of that, sir. Show me the captain's oral orders. Show 'em to me, sir."—*The Veteran.*

Sandy Was a Cagey Lad

"How was it you never let your mother know you'd won the V. C.?" "It wasna ma turrn tae write."—*Philadelphia Record.*

The Pilot's Farewell to the Old Machine

We've had many a flight together in fair and stormy weather,
But we've somehow always managed to pull through,
And we gave the Huns' Mercedes a replica of Hades,
And we've let the Albatross have something, too,
As we sent them on their death-dance,
Their fatal, fearful death-dance,
When we fought them up amongst the clouds of blue.

But I thought that we'd go under when they shot your struts asunder
On that morning not so very long ago,
But, thanks to God Almighty, we both of us got "Blighty,"
And we lived again to battle with the foe.
Oh! the nightmare of that nosedive,
That spinning spiral nosedive,
But we saved ourselves before we crashed below.

Now they say you're out of date and it's simply tempting Fate,
And to-morrow I've to fly a new machine
In all its pristine glory, which has yet to make its story,
Not like you, old 'bus, you veteran has-been,
With your mass of scars and scratches,
Your honored scars and scratches,
'Tis only you and I know what they mean!

How I almost started sobbing when I heard your engine throbbing,
That embodiment of joyous life and soul!
That responded in a second and on whom I always reckoned,
And never once my confidence you stole.
They may give me any new 'bus,
A spanking, brilliant new 'bus,
But 'twill never be your equal to control.

So your flying days are ending, and I s'pose they'll soon be sending
You home again to mercilessly scrap,
But now the war is over and I live again in clover,
I'll dream, as I've come through without mishap,
For aye of you, my hero,
My own unbeaten hero,
And thank you dearly once again, old chap.

E. Duncan Doring, in Flying (London).

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THE EVOLUTION OF MARTIN AEROPLANES



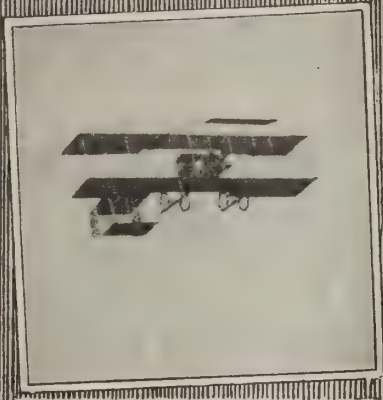
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MARTIN TRACTOR THE FIRST AEROPLANE IN ALASKA-DESIGNED, BUILT AND FLOWN BY MARTIN 1912.



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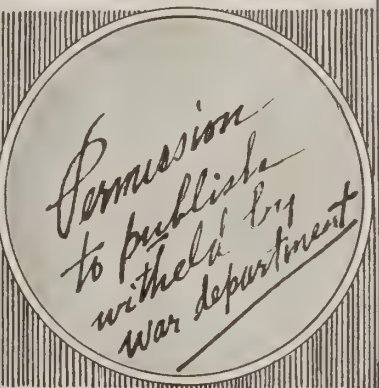
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THE MARTIN CONVERTIBLE HYDRO DESIGNED, BUILT AND FLOWN BY MARTIN 1913



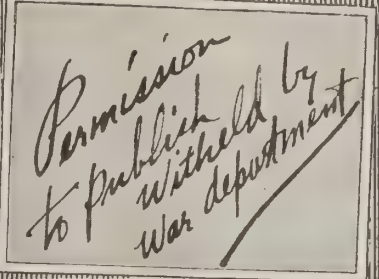
THE AEROMARINE REDESIGNED AND DEMONSTRATED BY MARTIN 1915



THE MARTIN CRUISING BOMBER DESIGNED AND BUILT BY MARTIN 1916



THE MARTIN SCOUT K III DESIGNED 1917 FOR BRITISH AIR BOARD BY MARTIN

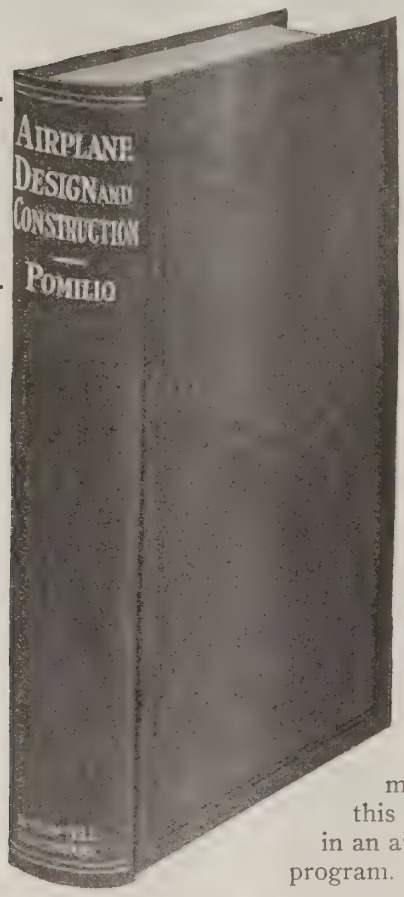


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(*Concluded from page* 1176)

gage is correct to use for the washer. The tensile force on E is a maximum of 3,500 pounds, and from Figure 5 we find that a ⅜-in. bolt has a strength of 7,700 pounds, so that it is amply strong.

The wire H exerts a force of 5,000 pounds on the fitting. Turning to Figure 4, we see that if the tensile strength is 60,000 pounds, and the thickness No. 12 gage, the minimum width is ¾ in.

For the wire used we shall assume that the shackle S requires a pin P, which has a diameter of 5/16 in. It is apparent that a washer must be spot welded or brazed onto the fitting at this point to take the force acting. To determine the total thickness of metal we refer to Figure 1, and find the same to be approximately .195 in. The fitting is No. 12 gage, which leaves .087 for the washer, and as .083 is No. 14 gage, that is the metal we shall use for the washer.

The following facts from which to lay out this fitting have therefore been determined:

Plate C

Thickness	No. 12 gage
Area on wood	7½ sq. in.
Width at wire lugs	¾ in.

Washer R

Thickness	No. 12 gage

Washer W

Thickness	No. 14 gage
One-half area	.5 sq. in.

Bolts E and F

Diameter	⅜ in.

Pin P

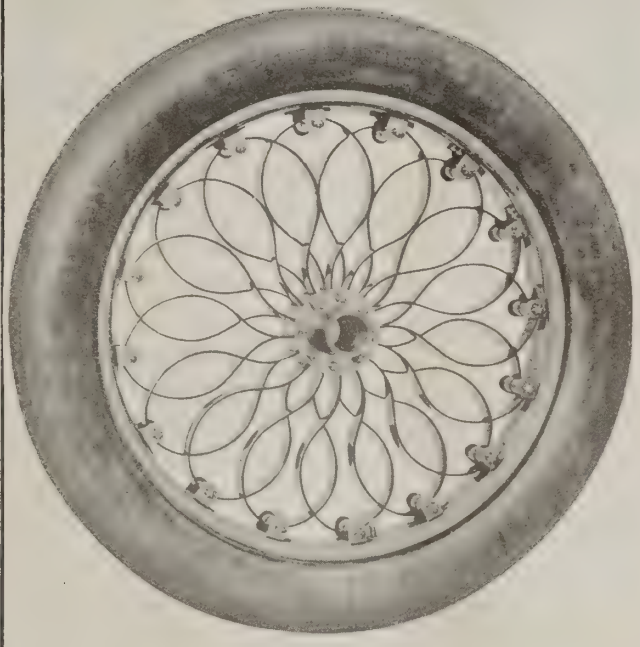
Diameter	5/16 in.

From this data it is an easy matter to design these parts and be reasonably certain that no changes will be necessary due to weakness. Although as an extra precaution a sand load test of the complete machine should be made.

ATLAS WHEELS

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(*Continued from page* 1167)

(i) 3
(j) 3. Maximum total 45.

Behaviour afloat (*Rule* 22)
(a) 6
(b) 6
(c) 6. Maximum total 18.

High speed (*Rule* 5)
For each knot in excess of required minimum, ½ — No Maximum

Low speed (*Rule* 5)
For each knot below the required maximum, 1 — No Maximum

Mooring out test in fair weather (*Rule* 8*a*)
For each complete 5 minutes less than the hour allowed from the completion of the 24 hour period, to the moment when the machine leaves the water, 1 mark.

Mooring test in moderate weather (*Rule* 8*b*)
For behaviour of machine during test, maximum marks 5.
For condition of machine at end of test, maximum marks, 5.

Method of fitting parachute (*Rule* 24)
Maximum marks 5.

27. With reference to Rule 6, when carrying out alighting and getting off tests, machine will start with the load of petrol and oil specified and will be allowed to fly for 20 minutes. If they have not carried out their tests by the end of that period, they must alight and fill up again.

28. The type of propeller used on any machine must be the same for all the tests.

29. Full load will include:
Instruments as under:
Rev. counter
Aneriod
Air speed indicator
Compass
Watch
Turn indicator
Bearing plate
Sextant
Air pressure gauge (when necessary)
Oil pressure gauge (when necessary)
Radiator thermometer (when necessary)
Petrol and oil sufficient to fly 450 nautical miles at 1,000 feet.
In addition, a load of 1,000 lbs., to include passengers if carried and lifebelts and parachutes, but not including crew or any gear specified in Rules 8a and 13.

30. Petrol and oil for the tests and, as far as possible, accommodation (at owner's risk) for the machines will be supplied free by the Government.

31. The Judges shall have the right to disqualify any machine which is very seriously defective in any respect.

32. The Judges shall have the right to put up a service pilot to fly any of the machines, should they consider it desirable to do so at Government risk.
All tests will, however, be carried out by the entrant's pilot.

33. During or on completion of any flying test, if it is necessary to effect any repairs to the machine after alighting, it will be considered to have failed in that particular test.
This does not apply to cases where the machine is by the judges' instructions being flown by a pilot other than the entrant's pilot.

34. An entrant may enter more than one type of machine.

35. If a machine is wrecked during the competition, it may, at the discretion of the judges, be replaced by another, but the replacement machine must carry out the whole programme of tests.

36. The decision of the judges shall be final in all matters affecting the competition.

37. The Government does not accept any liability in respect of accidents during the competition, whether resulting in injury to personnel or damage to the machine (except as specified in Rule 32).

38. The Government reserves the right to adjourn the competition.

39. The Government reserves the right to withold any or all of the prizes if, in the opinion of the judges, no real advance on existing designs is shown.

40. The Government will, if the entrant agrees, buy the machine winning the first prize, the design to remain the property of the manufacturer. The maximum price payable under this head will be £8,000.

41. The following prizes are offered:

1st prize	£10,000
2nd prize	4,000
3rd prize	2,000

42. Entries to close December 31.

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Silver Star on Victory Ribbon Permitted for Only Certain Citations

Washington, D. C.—The War Department authorizes the publication of the following information:

It has been brought to the attention of the War Department that silver stars are being worn on Victory ribbons in some cases for citations which under army regulations are not sufficient authority for that decoration. The conditions which must be fulfilled for wear of these silver stars are set forth in paragraph 187, A. R., as amended by C. A. R., No. 85, and they are requirements of law. A silver star cannot be worn unless all three of the following conditions are fulfilled:

(a) The citation must be published in orders from headquarters of a force commanded by a general officer. A special citation certificate does not carry with it a silver star, neither does a citation in orders from headquarters of a force commanded by an officer below the grade of general officer, even though it may be appropriate command of a general officer.

(b) A silver star cannot be worn for any citation for which a Medal of Honor Distinguished Service Medal or Distinguished Service Cross was awarded.

(c) The citation must be for gallantry in action. This does not mean extraordinary individual heroism, but it does require that the acts for which awarded were performed in a gallant manner and under hostile fire, and the citation must distinctly show such to have been the case.

All officers and enlisted men wearing silver stars will present to the commanding officer of camp, post or station, for approval, copies of citation on which their claim is based. Cases which may be in doubt will be forwarded to the Adjutant General for decision. Copies of all approved citations of officers will be forwarded by the commanding officer, noting his approval, to the Adjutant General for file with officer's efficiency record; those of enlisted men will be filed with the individual's service record.

Commercial Air Routes Operating Throughout Germany

In spite of the disturbed internal conditions in Germany, a determined attempt is being made to establish aviation on a permanent commercial basis.

From reports recently published in *Flight* (London) it appears that a fairly large number of passenger services have been running for some time, mostly radiating from Berlin. Routes from the capital are in operation in Weimar, Frankfurt, Leipzig, Warnemunde, Hanover, Westphalia, Hamburg and Breslau. There are also services between Weimar and Frankfurt, Hamburg and Warnemunde, Leipzig and Weimar and Hanover and Westphalia.

The Berlin-Weimar route opened as early as February 5. The results for the period up to the end of the month showed that 120 flights took place, of which all but eighteen were successfully terminated. There were no accidents. The Berlin-Hamburg route was opened on March 1 and on this service also the results were considered satisfactory. In spite of bad weather and interruptions owing to trouble in Berlin a total of 108 flights, i. e., three to four per day, were accomplished and a total load of no less than 3,737 kilogrammes were carried. The average duration of each journey was 2 hours 11 minutes, with a record trip of 1 hour 15 minutes. This and other services were utilized for the carriage of mails, and on this route only 6.1 per cent. failed to get through owing to bad weather and had to complete the journey by train.

All these services are operated by the Deutsche Luft Rederie, a combine of various German aeronautical firms.

Return tickets are issued and are valid for a period of thirty days. Flying kit and motor transport to and from the aerodrome are provided and are covered by an inclusive charge of which the following are representative: Berlin-Hamburg: single, 450 marks; return, 700 marks. Berlin-Breslau: single, 500 marks; return, 750 marks. Berlin-Weimar: single, 450 marks. Serial tickets available for 10 flights on any of the routes operated by the combine are issued at 3,600 marks. These tickets are transferable, and work out at an average reduction of 20 per cent. Luggage is carried free of charge, but the total weight of passenger—who is carried at his own risk—and baggage combined must not exceed a certain limit. Mails and parcels are also carried by the company, which is working in conjunction with the Hamburg-Amerika line, through whose offices bookings may be effected.

Apparently the railway troubles have reacted favorably on aerial transport and a considerable increase of traffic has been caused. On the Berlin-Weimar route, which appears the most popular, the number of flights from February to the end of April was 538, while between Hamburg and Berlin from March 1 to the end of April there were 262 flights.

It is also of interest to note that a further fusion of interests of the various already existing commercial aviation companies is being organized under the direction of the Sablatnig Aircraft Factory and the Luftfah G.m.b.h.



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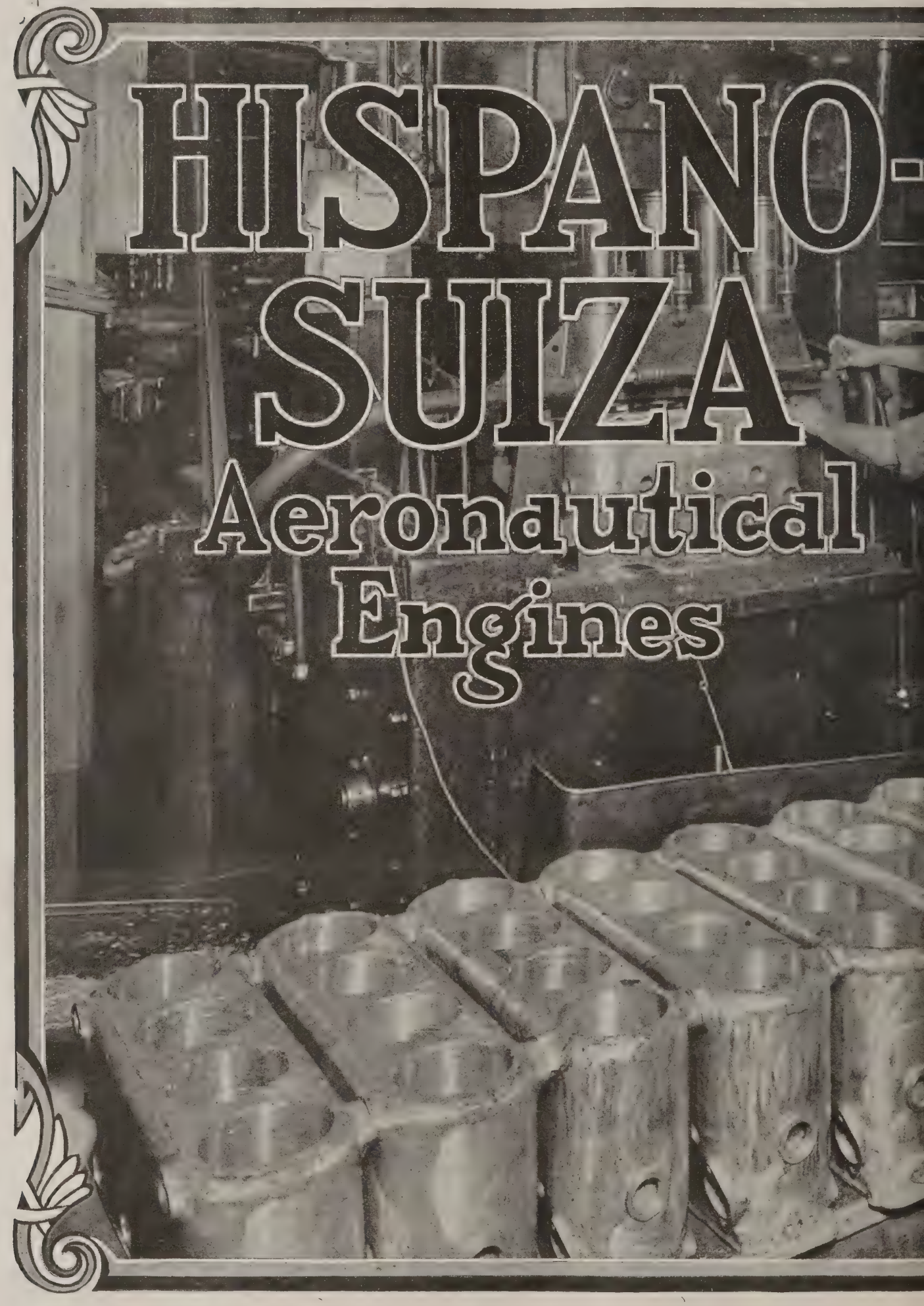
Christmas Airplanes

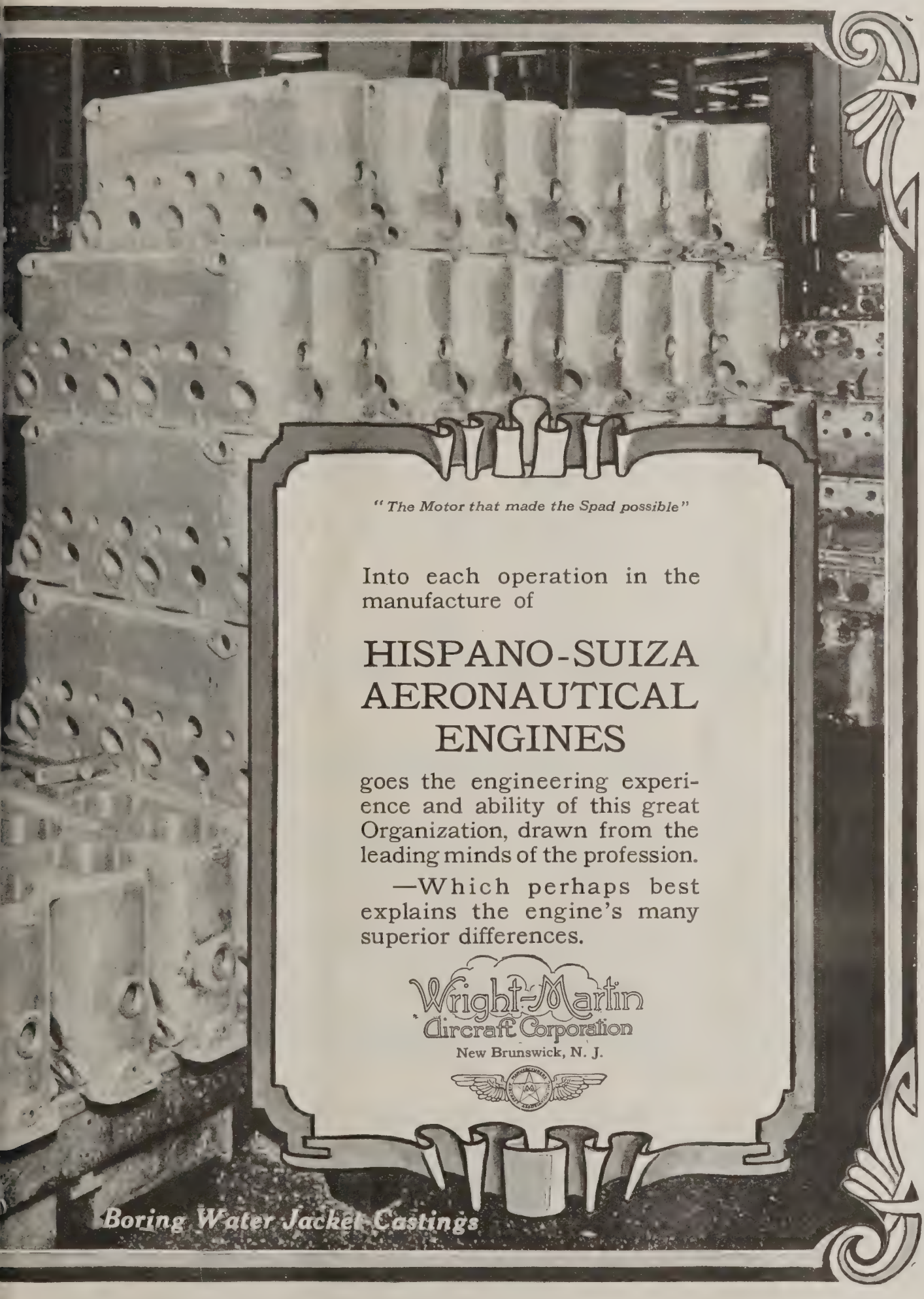
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Performance of the B.-G. Model 1 A Spark Plugs used on Liberty motors and two Hispano motors, which flew in the Great Toronto-New York Aerial Derby.

The names of the pilots using the B.-G. plugs, the order in which they finished, the total flying time before and including this race, and the plug performance on each ship are given below:

Place	Time in minutes	Motor	Name of pilot	Total flying hours of plugs	No. plugs missed	No. plugs failed
1	465¼	Liberty	Lt. B. W. Maynard	11	3	1
3	524¼	Liberty	Lt. D. B. Gish	22	0	0
4	545¼	Liberty	Col. G. C. Brandt	10	0	0
5	559¾	Liberty	Lt. M. J. Plumb	60	0	0
6	562	Liberty	Lt. P. H. Logan	10	0	0
7	564	Liberty	Lt. Ben Adams	90	0	0
8	570	Liberty	Lt. John P. Roullet	10	1	1
9	572	Hispano	Maj. R. W. Schroeder	12	1	0
10	576	Liberty	Sgt. C. B. Coombs	14	0	0
12	597½	Liberty	Lt. R. D. Midkiff	70	0	0
13	602¼	Liberty	Lt. Ross Kirkpatrick	12	0	0
14	607¾	Liberty	Lt. W. C. F. Brown	10	0	0
15	621½	Hispano	Lt. Charles Colt	14	0	0



Lieut. Gish used the same ship with the same set of plugs after Lieut. Brown completed the race.

The B.-G. plugs that completed the race received no attention whatsoever during the race and did not lose a cylinder from any cause. All of the B.-G. plugs used in this race and not listed as failures are still flying.

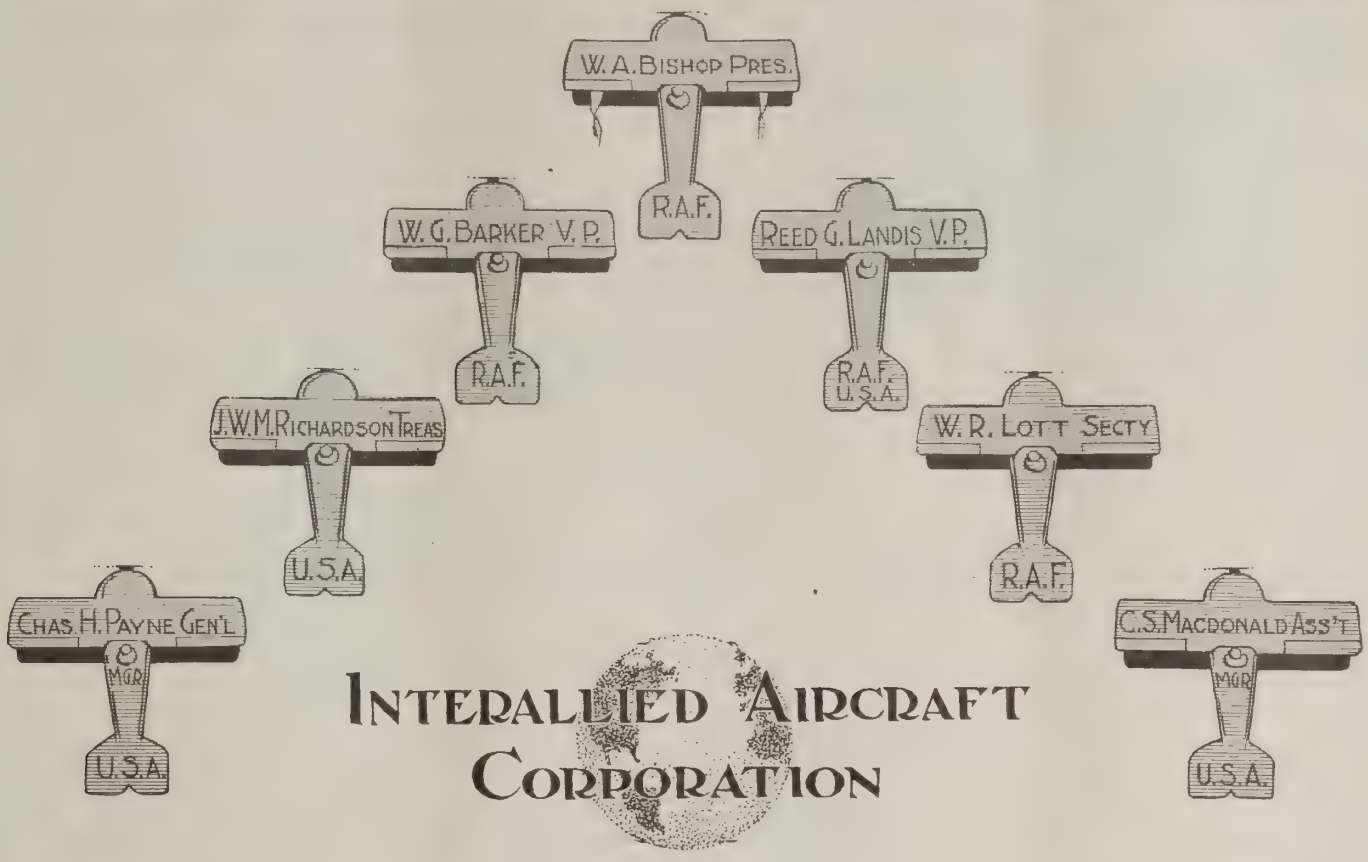
All the B.-G. plugs are listed as "Permissible for use on all service motors in the Army Air Service."

When ordering be careful to specify the B.-G. 1 A for ordinary service or cross country flying and the B.-G. 1 B for long non-stop cross country flying and extremely high temperature work.

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AERIAL AGE WEEKLY

Vol. IX SEPTEMBER 8, 1919 No. 26

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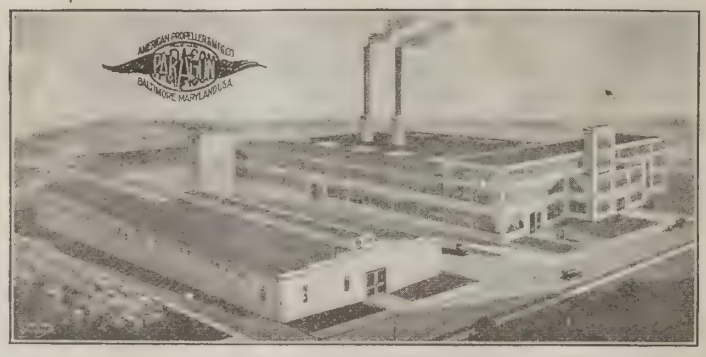
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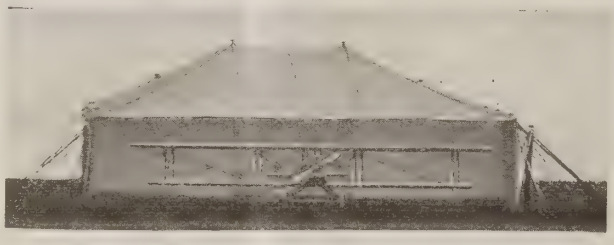
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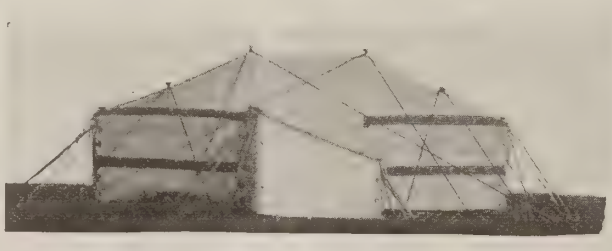
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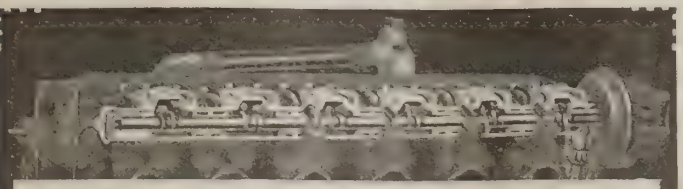
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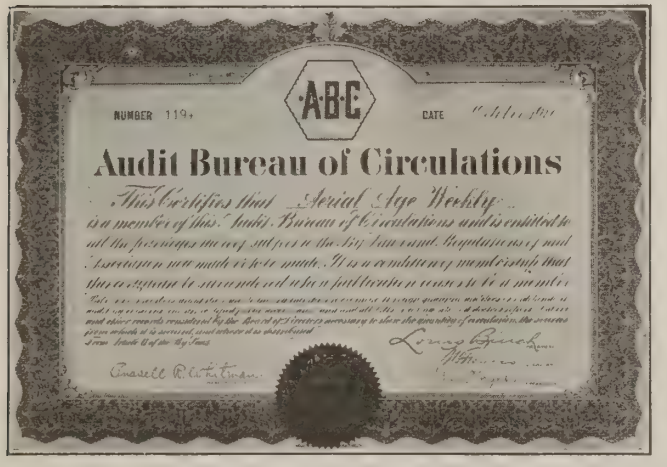
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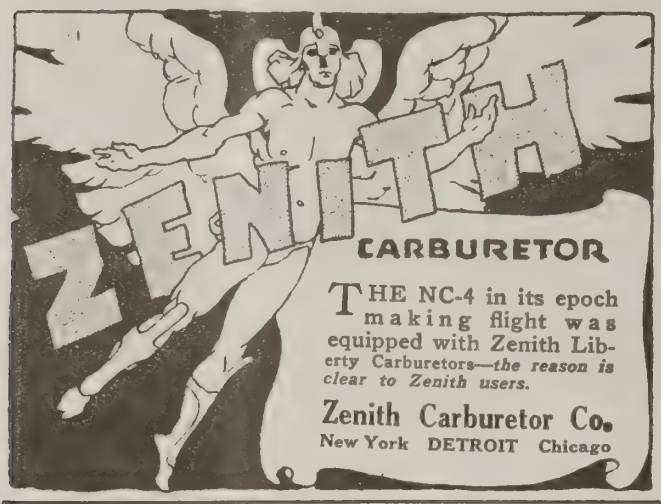
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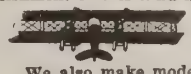
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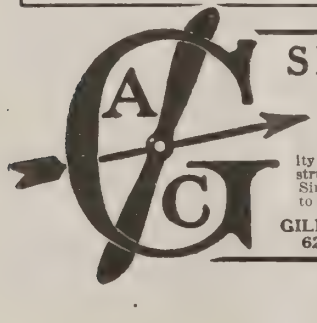
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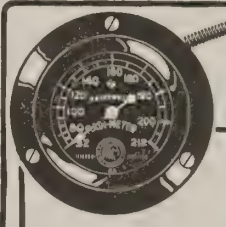
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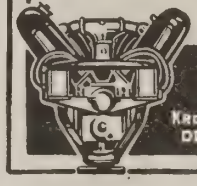


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